

DPU

DR. D. Y. PATIL VIDYAPEETH (DPU), PIMPRI, PUNE

(Deemed to be University)

(Accredited (3rd Cycle) by NAAC with a CGPA of 3.64 on four point scale at 'A++' Grade)

(Declared as Category - I University by UGC Under Graded Autonomy Regulations, 2018)

ENVIRONMENTAL IMPACT



Environmental Research

**REPORT ON UNIVERSITY RESEARCH
CENTRE WITH FOCUS ON
ENVIRONMENTAL SUSTAINABILITY**

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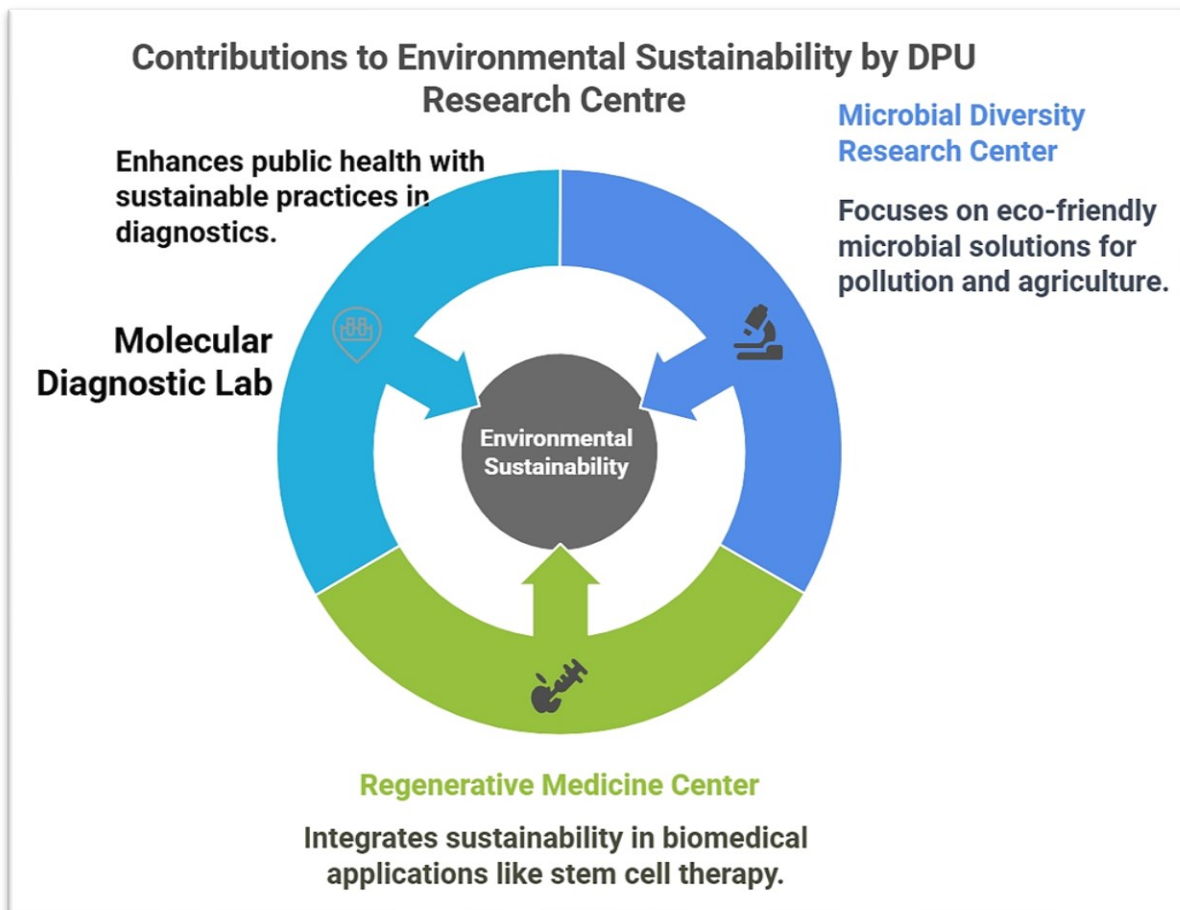
1. PREAMBLE

Dr. D Y Patil Vidyapeeth, Pimpri, Pune, is home to several cutting-edge research centers contributing to environmental sustainability. The Microbial Diversity Research Center explores eco-friendly microbial solutions for bioremediation, waste degradation, and sustainable agriculture. By harnessing beneficial microbes, this center advances pollution control and ecosystem restoration.

The Regenerative Medicine Center focuses on innovative biomedical applications while integrating sustainability principles. Research on stem cell therapy, tissue engineering, and biomaterial development incorporates green chemistry approaches, reducing environmental impact in healthcare innovations.

The Molecular Diagnostic Lab plays a vital role in disease surveillance, early detection, and personalized medicine. Its research enhances public health while minimizing the environmental burden of medical waste through precise diagnostics and sustainable laboratory practices.

Together, these centers foster interdisciplinary research, technological advancements, and eco-conscious solutions. By promoting sustainable scientific practices, they contribute to environmental conservation, resource efficiency, and long-term ecological balance, aligning with global sustainability goals. Dr. D Y Patil Vidyapeeth remains committed to pioneering research that bridges healthcare, biotechnology, and environmental stewardship for a more sustainable future.



2. IMPACT OF ENVIRONMENTAL SUSTAINABILITY RESEARCH CENTRES AND INITIATIVES

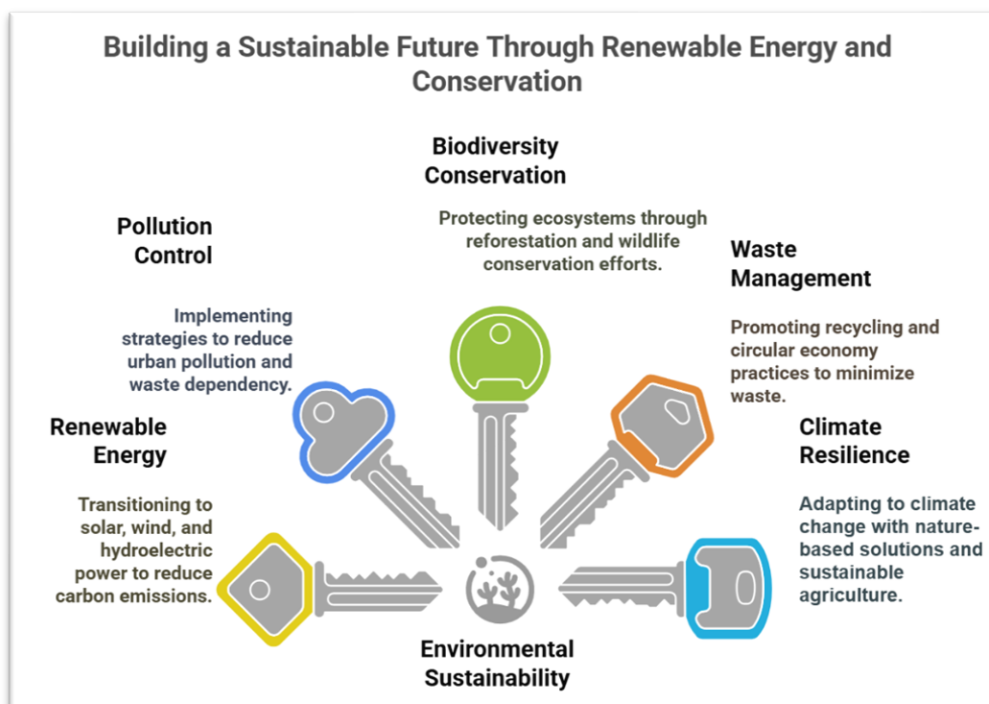
Dr. D. Y. Patil Vidyapeeth, Pune, leads sustainability research through advanced centers focused on renewable energy, pollution control, biodiversity conservation, waste management, and climate resilience. These initiatives drive impactful solutions through research, technology, and interdisciplinary collaborations.

RENEWABLE ENERGY AND CARBON REDUCTION

The university promotes solar, wind, and hydroelectric power to reduce carbon emissions. Large-scale solar PV installations and improved wind turbine efficiency enhance energy output with minimal ecological impact.

POLLUTION CONTROL AND SUSTAINABLE URBAN DEVELOPMENT

Innovative waste-to-energy projects convert non-recyclable waste into energy, reducing landfill dependency. Green buildings and IoT-based air quality monitoring help lower urban carbon footprints. Biodiversity Conservation and Ecosystem Restoration



Afforestation, marine habitat restoration, and wildlife conservation projects support biodiversity and carbon sequestration. Collaborations with conservation agencies ensure ecological balance.

WASTE MANAGEMENT AND CIRCULAR ECONOMY

Recycling, composting, and industrial symbiosis reduce landfill waste. Zero-waste policies and biodegradable packaging initiatives promote sustainable practices.

CLIMATE CHANGE ADAPTATION AND RESILIENCE STRATEGIES

Nature-based solutions like wetland restoration and urban green spaces mitigate flood risks. Agroforestry and precision farming improve food security while minimizing environmental impact. Through these initiatives, the university fosters sustainable innovations for a resilient future.

3. MICROBIAL DIVERSITY RESEARCH CENTRE (MDRC) CENTRE OF EXCELLENCE, DR. D. Y. PATIL BIOTECHNOLOGY AND BIOINFORMATICS INSTITUTE, DPU, PUNE



1) NAME OF THE CENTRE

Microbial Diversity Research Centre (MDRC), Dr. D. Y. Patil Biotechnology & Bioinformatics Institute, Dr. D. Y. Patil Vidyapeeth, Tathawade, Pune 411033.

2) ABOUT THE LAB- SCOPE OF AREAS, PURPOSE OF THE LAB, MAJOR RESEARCH THRUST AREAS

Microbial Diversity Research Centre was established as a Centre of Excellence by Dr. D. Y. Patil Vidyapeeth vide resolution no. PMB-05-13 of the Board of Management, Dr. D. Y. Patil Vidyapeeth, Pune.

3. ABOUT THE STAFF COMPOSITIONS, THRUST AREAS, RESEARCH PROJECTS AND FACILITIES AT MICROBIAL DIVERSITY RESEARCH CENTRE AT DPU, PUNE

Sr. No.	Aspect	Action taken
1	Centre Incharge	Dr. Neelu Nawani, Professor Ph.D. (Microbiology)
2	Full-Time Equivalent (FTE) Staffs	<ul style="list-style-type: none"> • Dr. Manisha Junnarkar • Dr. Supriya Kore • Dr. Viniti Vaidya • Dr. Swapnil Gaikwad • Mr. Amol Salgar
3	Research Personnels	<ul style="list-style-type: none"> • Dr. Arohi Srivastava, Ph.D. (UK), DPU Post-Doctoral Fellow • Mrs. Priyanka Wagh, M.Sc., DST-Junior Research Fellow • Mrs. Bhagyashree Shahakar, M.Sc., DPU Ph.D. Fellow • Ms. Dhanishtha Attarde, M.Sc., DPU Ph.D. Fellow • Ms. Nivedita Mishra, M.Sc., DPU Ph.D. Fellow • Mr. Mohsin Shaikh, M. Tech. Project Student
4	Thrust Areas	<ul style="list-style-type: none"> • Health Biotechnology • Environmental Biotechnology • Bioremediation and Pollution Mitigation • Antimicrobial resistance • Microbial Diversity and Genomics • Plant microbe interactions • Microbial Bioinformatics • Nanotechnology • Biopolymer Science
5	Collaborations and collaborative projects which aided in development of the centre and sharing of facilities	<ul style="list-style-type: none"> • COPD project funded by SIDA, Sweden • Collaboration with University of Skövde, Sweden and University of Pune, Pune • Bioremediation project funded by SIDA, Sweden • Indo-Tunisian project funded by DST and Ecole Nationale D'Ingenieurs de Sfax, Tunisia • Anti-mutagenic properties project funded by DST in collaboration with University of Pune, Pune
6	Industry collaborations	<ul style="list-style-type: none"> • Collaboration with Praj Industries for DBT research grant “Opportunities to Explore Microbial Diversity for industrial important microbial products”

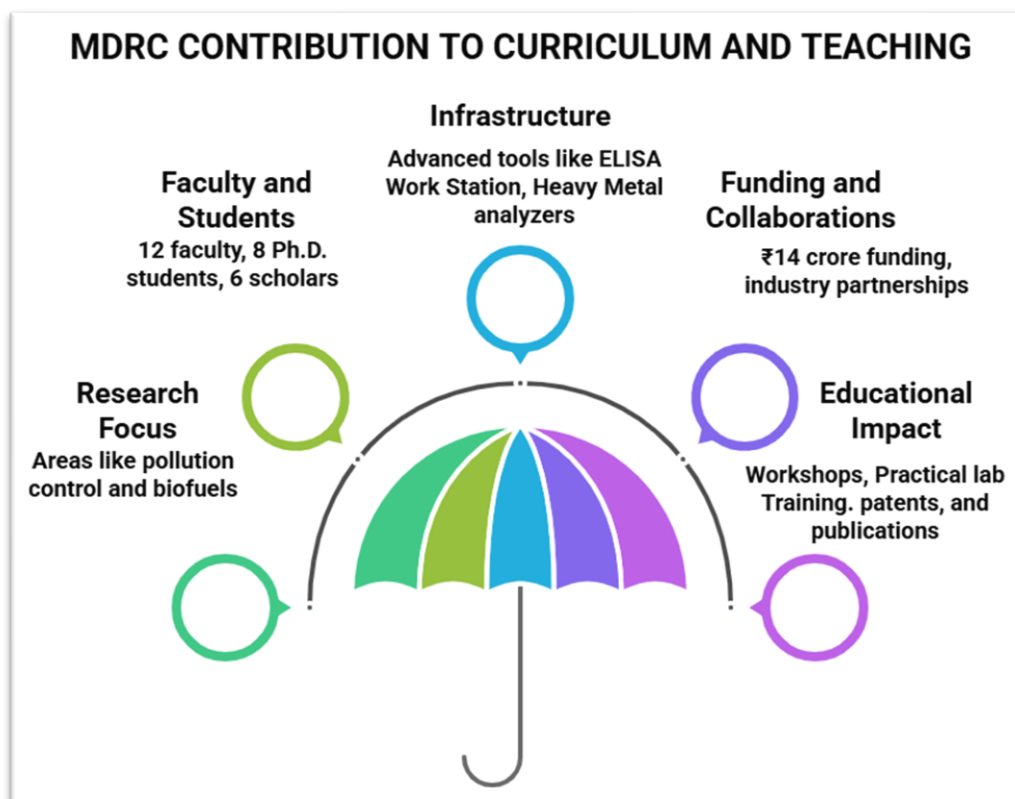
Sr. No.	Aspect	Action taken
7	Instruments available	Speciality Equipment (Funded by extramural projects or institute as indicated)
		Microlog M Microbial Identification System, Biolog Inc. (SIDA project)
		Voltammetry system for heavy metal analysis (SIDA project)
		Potentiostat (Carbon Sequestration Program DST Project)
		Flue Gas Analyzer (SIDA project)
		Particulate Matter Counter (GYTI-BIRAC project)
		High speed centrifuge, Dynamica (SIDA project)
		Laminar air flow, Microfilt (SIDA project)
		Soil and water sampling augers (Indo-Tunisian project)
		Robotic Automated ELISA work station (DBT project with Praj)
		High Speed Plate Centrifuge (DBT project with Praj)
		Ultralow temperature freezer minus 80, Thermo (DBT project with Praj)
		Fluorescent Microscope with Imaging facility, Olympus (Anti-mutagenic DST project)
		Biosafety level cabinet Class II, Microfilt (Funded by Institute)
		Lyophilizer, Labconco (Funded by Institute)
		Ultralow temperature freezer minus 80, Thermo (Funded by Institute)
		Thermocycler, Biorad (Funded by Institute)
		General instruments (Funded by extramural projects or institute as indicated)
		Magnetic stirrer (SIDA project)
		Refrigerated Shaking Incubator (SIDA project)
		Bacteriological Incubator (SIDA project)
		pH meter (Funded by Institute)
		Electronic balance (Funded by Institute)
		Autoclave- portable (Funded by Institute)
		Hot air oven (Funded by Institute)
		Hot plate stirrer (Funded by Institute)
		Vortex mixer (Funded by Institute)
Benchtop Centrifuge (Funded by Institute)		
Microfuge (Funded by Institute)		
Microscope (Funded by Institute)		
8	Microbes available in collection	Bacteria: approx 750 (includes approx. 500 actinomycetes)
		Fungi: 05
		Algae: 20
		Yeasts: 02
9	Funding/ Publications/ Patents	<ul style="list-style-type: none"> • Funding mobilized through external grants: 931 lakhs INR and 11.5 million SEK (equivalent to 805 lkahs INR) • Publications: Till 2015- 32; 2016-2021- 33 • Patents: 06; Granted 02

4. THE CONTRIBUTION TO THE TEACHING AND SUPERVISION OF UG AND PG PROGRAMS

The Microbial Diversity Research Centre (MDRC), established as a Centre of Excellence by Dr. D. Y. Patil Vidyapeeth in 2015, plays a vital role in research, teaching, and student training. It is the largest and most well-funded research group in the institute, with twelve faculty members, eight Ph.D. students, and six research scholars, while over 100 UG and PG students have completed their research projects here. The centre has received ₹14 crore in funding from prestigious national and international agencies, collaborating with industries like Praj for microbial screening.

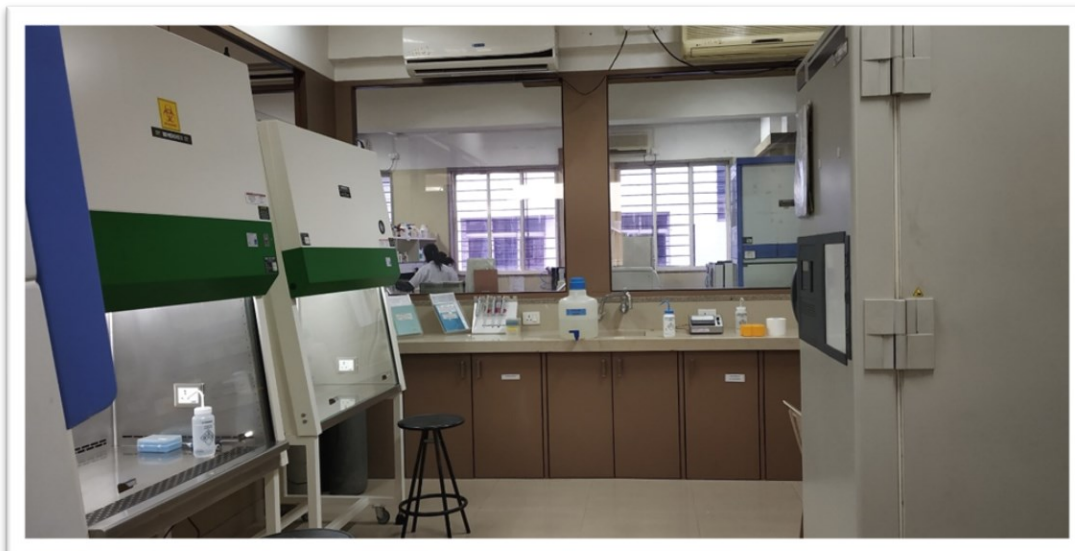
MDRC focuses on eco-friendly solutions for pollution control, bioactive microbial compounds, biofuels, and green nanotechnology. It houses advanced research infrastructure, including heavy metal analyzers, ELISA workstations, and robotic culturing systems, essential for both teaching and research. Students gain hands-on experience with cutting-edge technologies, contributing to patents, publications, and innovations like the award-winning biological air purifier.

International collaborations with Sweden, Tunisia, and the USA, alongside national partnerships, enhance student mobility, faculty exchange, and interdisciplinary learning. MDRC promotes research-driven education, equipping students with the skills needed for academic and industrial careers through training, conferences, and workshops, fostering innovation and global scientific engagement.

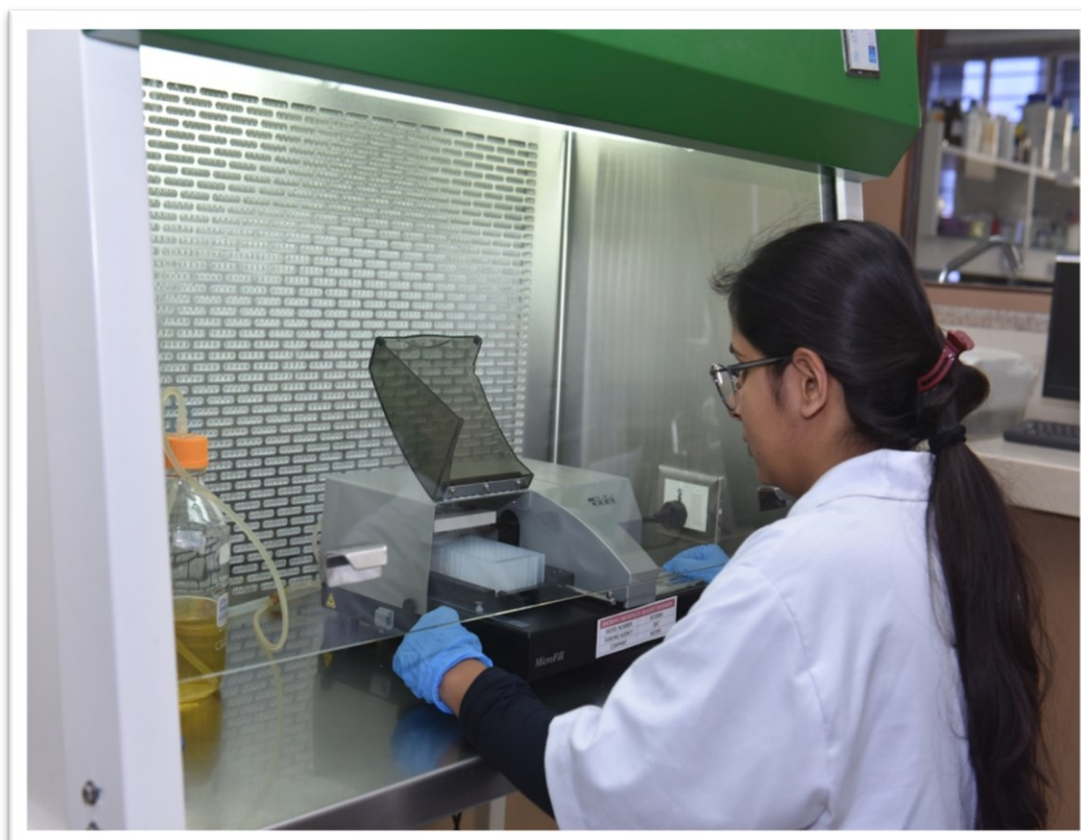


5. RESEARCH FACILITIES AT MDRC

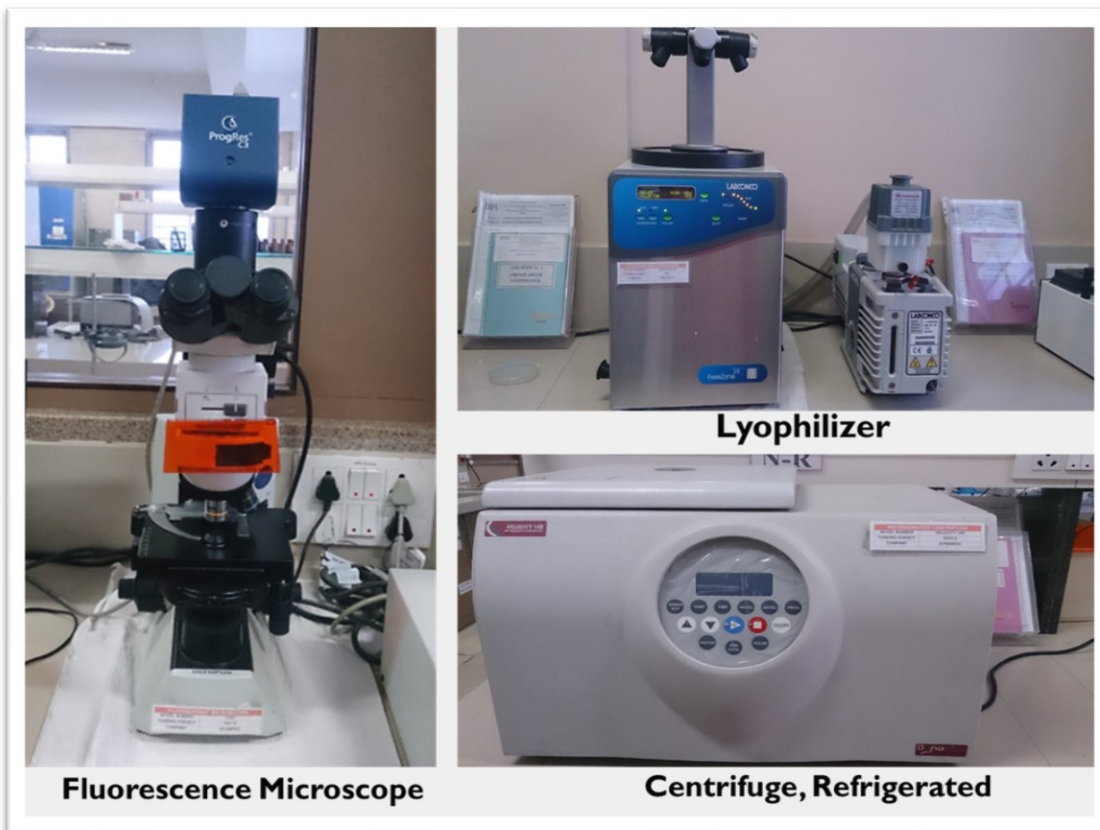
The centre has received funding for research from several International and National agencies to lead various research projects centered on Environmental Sustainability. Several high-end sophisticated equipment is procured from research funding made available from the Funding agencies and Intramural grants from DPU. These advanced equipment's are available to execute high quality research carried out by UG/PG/Ph.D. students at the University.



Biosafety Cabinets and -86 Degree Deep Freezers



ELISA Workstation for analysis of biological metabolites



Fluorescence Microscope

Lyophilizer

Centrifuge, Refrigerated

Facilities for Cellular and Molecular Biology Studies on Environmental Sustainability Experimental Evidence



Multimode ELISA Plate Reader (BioTek) for analyzing Environmental Sustainability Research



Voltammetry Heavy Metal Analyzer for Analyzing Environmental Components



Total Organic Carbon (TOC) for Analyzing Environmental Components

6. ACHIEVEMENTS, AWARDS AND RECOGNITIONS FOR THE CENTRE

1. BEST PRIZE AT INDIA INTERNATIONAL SCIENCE FESTIVAL 2021

The prize was for the innovation “Biosmotrap: a low-cost multipurpose biological air purifier” at the India International Science Festival 2021 organized by Vignyan Prasar, Ministry of Science and Technology at Panjim, Goa during 10-13 Dec 2021 (Cash prize of Rs. 25000/- to the presenting student Tejas Vannalwar, Project Mentor Dr. Neelu Nawani)

Promotion of the product on Vigyan Prasar Channel

(<https://ne-np.facebook.com/indiasciencetv/videos/biosmotrap-a-unique-biological-purifier/285157396885590/>)



2. DRUG DISCOVERY HACKATHON 2020 PRIZE,

AICTE and MHRD, Govt. of India

Dr. Neelu Nawani, Mr. Kiran Lokhande, Ms. Sayali Doiphode won prize of Rs. 25000/- in the Drug Discovery Hackathon 2020 for the project “Identification of drug candidates that are effective against coronavirus SARS-CoV-2- by employing a hackathon for in-silico drug discovery, followed up by chemical synthesis and biological testing.”

We Are Happy to Announce That Our Solution for Drug Discovery Against Covid-19 has been Selected & Awarded with Cash Prize of Rs. 25,000/- in DDH2020 Phase-I

Project Title: Computational screening of molecular fragments and fragment linking to design novel inhibitors for SARS-CoV-2 main protease

Team Mentor:
Prof. N.N. Nawani,
Prof. and Incharge of Microbial Diversity Research Centre,
Ph.D. Coordinator, DYPBBI, Pune.

Team Leader:
Mr. Kiran Bharat Lokhande,
SRF-ICMR, Ph.D. Scholar,
Bioinformatics Research Lab.,
DYPBBI, Pune.

Team Member:
Ms. Sayali Doiphode,
Ph.D. Scholar,
Bioinformatics Research Lab.,
DYPBBI, Pune.

3. BEST RESEARCH PRESENTATION PRIZE AT INTERNATIONAL CONFERENCE

on Biotechnology for Resource Efficiency Energy, Environment, Chemicals and Health (BRE3CH 2021) during December 1-4, 2021 at CSIR-Indian Institute of Petroleum, Dehradun and BRSI.



4. BEST RESEARCH AWARD BY TERRE

A.P.J. Abdul Kalam Young Research Fellowship.

5. SPECIAL AWARD FOR TECHNICAL EXCELLENCE- RESEARCH

For the Science Documentary “A Probiotic Revolution” produced by Dr. Neelu Nawani and Directed by Mr. Tejas Vannalwar by National Science Film Festival of India 2022. Two Science Documentary Films about the research at MDRC were nominated at the 11th National Science Film Festival of India, 2022 held at Bhopal during 22-26 Aug 2022.

6. A NATIONAL AWARD FOR “BEST INNOVATION TECHNOLOGY FOR RE-USE”

Was won at National-level competition organized by Confederation of Indian Industries (CII, Chennai), Government of India on 28th August 2021.





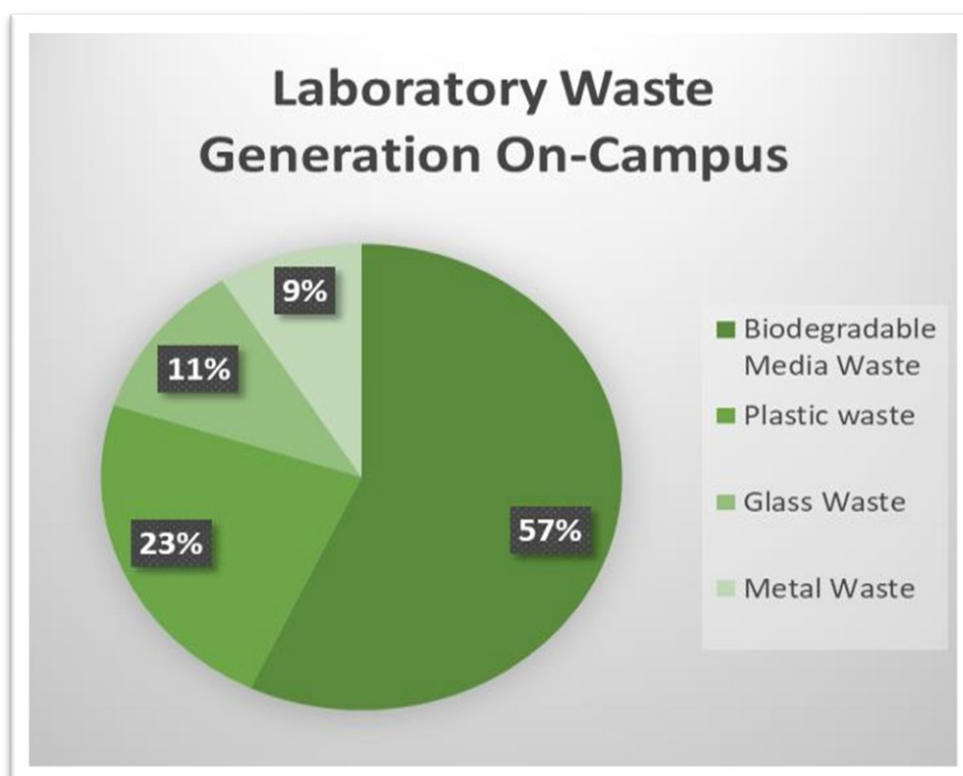
7. GANDHIAN YOUNG TECHNOLOGY INNOVATION AWARD 2018

SRISTI, BIRAC-GYTI, DBT and NIF (One of the 23 projects selected out of 3000 at a national level)
 Project Title: "A multipurpose low-cost biological air purifier", funding Rs. 15 lakh from BIRAC-GYTI under Socially relevant innovation



8. MAJOR ACHIEVEMENTS- EXTRAMURAL FUNDING BY THE FACULTY OF LAB, ANY TRAINING PROGRAMME CONDUCTED, WORKSHOP, CONFERENCES CONDUCTED WITH CONFERENCE REPORT. (2020-2021)

1. **Extramural Research Project:** A project entitled “Segregation and management of laboratory wastes for resource recovery and value addition” File number: DST/TDT/WM/2019/1, has been funded by Department of Science and Technology, Govt. of India. (**Date of Commencement: 01/10/2020**)
 - A) Construction of waste agar processing unit **completed** in campus of **Dr. D. Y. Patil Biotechnology and Bioinformatics Institute, Tathawade, Pune**. Installation of self-fabricated **Pyrolizer** machine was completed.
 - B) Training session for research faculty, lab attendants and house-keeping staff was conducted in the campus. The type and volumes of waste generated in the campus was analyzed, importance of segregation of waste at the point of inception was conveyed to the cleaning staff through the training session.
 - C) Survey of agar waste generating start-ups, plant tissue culture labs, academic and research microbiology labs from Pune region is under surveillance. The collected data will be used for database mapping of agar waste generated at Pune region.
 - D) We are maintaining a weekly record of the waste generated on our campus.



Waste Recycling plant established at the Tathawade Campus by MDRC from funding received from Department of Science and Technology under the Technology Development and Transfer Division and from Dr. D. Y. Patil Vidyapeeth, Pune.



Training for Ancillary Staff of DYPBBI, the event was volunteered by MDRC lab

PARTICIPATION IN CONFERENCES (ORAL/POSTER PRESENTATION)

Title of the Paper Presented	Symposium /Conference	Dates of the Symp./Conf.	Authors
Production and Functional assessment of bio-commodity products using waste media from laboratories (Invited Oral Presentation)	International Conference on Biotechnology for Sustainable Agriculture, Environment and Health (BSAEH-2021) Jaipur, Rajasthan, India	April 04-08, 2021	Dr. Neelu Nawani
Technology for recycling waste agar-media from laboratories: an avenue of Circular bioeconomy (Poster & Flash talk)	International Conference on Biotechnology for resource Efficiency, Energy, Environment, Chemical & Health (BREEECH-2021), Dehradun, India	December 1-4, 2021	Ms. Priyanka Wagh
Antimicrobial resistance and its potential biocontrol agent	International Conference on Biotechnology for resource Efficiency, Energy, Environment, Chemical & Health (BREEECH-2021), Dehradun, India	December 1-4, 2021	Ms. Bhagyashree Shahakar
BIOSMOTRAP: A low-cost biological air filter (Poster & Flash talk)	International Conference on Biotechnology for resource Efficiency, Energy, Environment, Chemical & Health (BREEECH-2021), Dehradun, India	December 1-4, 2021	Mr. Tejas Vannalwar
BIOSMOTRAP: A low-cost biological air filter	Indian International Science Festival-2021, Goa held on 11 th and 12 th of December 2021.	December 11-12 th ,	Mr. Tejas Vannalwar & Dr. Neelu

Title of the Paper Presented	Symposium /Conference	Dates of the Symp./Conf.	Authors
(Poster & Model)		2021	Nawani
Jaivik Upchaar: A film of solution to curb pollution (Science film)	11th National Science Film Festival of India (NSFFI) 2021, Award ceremony: 26 th Aug, 2022	August 21-26 th , 2022	Dr. Neelu Nawani
A probiotic sensation (Science film)	11th National Science Film Festival of India (NSFFI) 2021	August 21-26 th , 2022	Dr. Neelu Nawani

7. RESEARCH PUBLICATIONS

- 1) Kulkarni V, Alexander M, Bhosale R, Jain D, Deshpande P, Gitlin ES, Vaidyanathan A, Chalem A, Naik S, Gupte N, Nawani N, Gupta A, Mathad J. Discordance of 3rd and 4th generation QuantiFERON-TB Gold assays by pregnancy stages in India. *J Clin Tuberc Other Mycobact Dis.* 2024 Dec 4;38:100504. doi: 10.1016/j.jctube.2024.100504.
- 2) Pagar R, Deshkar S, Mahore J, Patole V, Deshpande H, Gandham N, Mirza S, Junnarkar M, Nawani N. The microbial revolution: Unveiling the benefits of vaginal probiotics and prebiotics. *Microbiol Res.* 2024 Sep;286:127787. doi: 10.1016/j.micres.2024.127787.
- 3) Lokhande KB, Pawar SV, Madkaiker S, Shrivastava A, Venkateswara SK, Nawani N, Wani M, Ghosh P, Singh A. Screening of potential phytomolecules against MurG as drug target in nosocomial pathogen *Pseudomonas aeruginosa*: perceptions from computational campaign. *J Biomol Struct Dyn.* 2024 Jan-Feb;42(1):495-508.
- 4) Lokhande KB, Kale A, Shahakar B, Shrivastava A, Nawani N, Swamy KV, Singh A, Pawar SV. Terpenoid phytocompounds from mangrove plant *Xylocarpus moluccensis* as possible inhibitors against SARS-CoV-2: In silico strategy. *Comput Biol Chem.* 2023 Oct;106:107912. doi: 10.1016/j.compbiolchem.2023.107912.
- 5) Lokhande KB, Tiwari A, Gaikwad S, Kore S, Nawani N, Wani M, Swamy KV, Pawar SV. Computational docking investigation of phytocompounds from bergamot essential oil against *Serratia marcescens* protease and FabI: Alternative pharmacological strategy. *Comput Biol Chem.* 2023 Jun;104:107829. doi: 10.1016/j.compbiolchem.2023.107829.
- 6) Lokhande KB, Pawar SV, Madkaiker S, Nawani N, Venkateswara SK, Ghosh P. High throughput virtual screening and molecular dynamics simulation analysis of phytomolecules against BfmR of *Acinetobacter baumannii*: anti-virulent drug development campaign. *J Biomol Struct Dyn.* 2023 Apr;41(7):2698-2712.
- 7) Yewale, P., Wagle, N., Lenka, S., Bannigol, P., Junnarkar, M., Prakash, D., Mandal, A., Stigh, C., Sahasrabudhe, T., Vannalwar, T., Thakare, P., Nikam, D., Pawar, S., Nawani, N. Studies on Biosmotrap: A multipurpose biological air purifier to minimize indoor and outdoor air pollution

- (2022) *Journal of Cleaner Production*, 357, art. no. 132001. DOI: 10.1016/j.jclepro.2022.132001
- 8) Gaikwad, S., Birla, S., Ingle, A.P., Gade, A., Ingle, P., Golińska, P., Rai, M. Superior in vivo Wound-Healing Activity of Mycosynthesized Silver Nanogel on Different Wound Models in Rat (2022) *Frontiers in Microbiology*, 13, art. no. 881404. DOI: 10.3389/fmicb.2022.881404
- 9) Lokhande, K.B., Pawar, S.V., Madkaiker, S., Nawani, N., Venkateswara, S.K., Ghosh, P. throughput virtual screening and molecular dynamics simulation analysis of phytomolecules against BfmR of *Acinetobacter baumannii*: anti-virulent drug development campaign (2022) *Journal of Biomolecular Structure and Dynamics*, Cited 3 times. DOI: 10.1080/07391102.2022.2038271
- 10) Lokhande, K., Nawani, N., K. Venkateswara, S., Pawar, S. Biflavonoids from *Rhus succedanea* as probable natural inhibitors against SARS-CoV-2: a molecular docking and molecular dynamics approach (2022) *Journal of Biomolecular Structure and Dynamics*, 40 (10), pp. 4376-4388. Cited 16 times. DOI: 10.1080/07391102.2020.1858165
- 11) Mansuri, A., Lokhande, K., Kore, S., Gaikwad, S., Nawani, N., Swamy, K.V., Junnarkar, M., Pawar, S. Antioxidant, anti-quorum sensing, biofilm inhibitory activities and chemical composition of Patchouli essential oil: in vitro and in silico approach (2022) *Journal of Biomolecular Structure and Dynamics*, 40 (1), pp. 154-165. Cited 2 times. DOI: 10.1080/07391102.2020.1810124
- 12) Mone, N.S., Bhagwat, S.A., Sharma, D., Chaskar, M., Patil, R.H., Zamboni, P., Nawani, N.N., Satpute, S.K. Naphthoquinones and their derivatives: Emerging trends in combating microbial pathogens (2021) *Coatings*, 11 (4), art. no. 434, Cited 7 times. DOI: 10.3390/coatings11040434
- 13) Rai, M., Bonde, S., Golinska, P., Trzcińska-Wencel, J., Gade, A., Abd-Elsalam, K., Shende, S., Gaikwad, S., Ingle, A.P. *Fusarium* as a novel fungus for the synthesis of nanoparticles: Mechanism and applications (2021) *Journal of Fungi*, 7 (2), art. no. 139, pp. 1-24. Cited 24 times. DOI: 10.3390/jof7020139

7. CONCLUSION

Dr. D. Y. Patil Vidyapeeth, Pune, is at the forefront of environmental sustainability research, integrating science-driven solutions with real-world applications. Its research centers contribute significantly to renewable energy advancements, ecosystem conservation, pollution control, and climate resilience. By fostering innovation, interdisciplinary collaboration, and global engagement, the institution plays a crucial role in shaping a sustainable future. Scaling up these initiatives through policy support, technological advancements, and community involvement remains essential in achieving long-term environmental resilience.