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Measuring Research Productivity of Biotechnological Department at SPPU University: 2014-2023

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Abstract

The aim of the study is to analyze the research productivity of faculty from 2014 to 2023. This study is based on the research portal and resume of the Faculty of Biotechnology at SPPU. This article discovers key points such as gender research productivity, types of research productivity, citations received per article, and analysis of citations received per year. During the study period, a total of 309 research papers were published in journals, books, book chapters, etc. Among them, the highest percentage of research papers published in academic journals during the study period was 94.49%. In 2016, faculty from the School of Biotechnology published the largest 40 research papers (12.94%). Gage, R.N. was the most prolific author, contributing 91 (29.44%) research papers in journals, book chapters, and books during the study period. Most published research papers are cited in Web of Science and Google Scholar. The highest number of citations for a research paper in a Web of Science article by Pratil R. H. is 905. Most faculty use the communication channels of academic publishing journals to publish research papers.

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Introduction

Research is an essential activity in universities and research institutions. Research productivity go hand in hand, as most research is significant to the success and reputation of a university and to the careers and trajectories of faculty and staff. Research publications are channels through which teachers contribute their share to the existing body of knowledge. These channel can be in the form of books, articles in Scholarly journals, technical reports, conference papers and proceedings, book chapters, training and patent law, and student mentoring. In other words, these publications are an indicator of scientists' research productivity and are used to rank academic institutions. Research productivity in this study refers to the amount of research a faculty member can complete in a given period of time. The purpose of this work is to present the current state of knowledge on this topic.

About Department

Biotechnology is a field that combines natural sciences and engineering sciences to utilize organisms, cells, and molecular analogues for various products and services. The Department of Biotechnology at Savitribai Phule Pune University, established in 1994, provides a two-year M.Sc. Biotechnology Course and offers Ph.D. programs in Biotechnology and related fields. The faculty members have a strong research background in different areas of Biotechnology and have gained experience from working in foreign laboratories. They have also published extensively in high-impact journals and have filed patents both nationally and internationally.

Objectives

1. Analysing the research productivity of the Department of Biotechnology SPPU, Pune for the period spanning from 2014 to 2023.

- Investigating the research productivity of the Department of Biotechnology, SPPU, in terms of publications in Journals, Book chapters, Books, and other mediums.
- Examining the authorship pattern and collaboration coefficient of the research productivity within the Department of Biotechnology.
- Identifying the author with the highest number of publications and analyzing their profile.
- Determining the largest publication in terms of gender distribution within the Department of Biotechnology.
- Assessing the Research Publication based on various norms and criteria.
- Exploring the year-wise research productivity within the Department of Biotechnology.

Review of Literature

Kumar Satish (2018) conducted a scientometric analysis on the research output of scientists at the Aryabhat Research Institute of Observational Sciences in Nainital. The study revealed that over a span of 15 years (2001-2015), a total of 574 research papers were published. Notably, the year 2013 stood out as the most productive year, with 78 research papers (13.59%) being published. Furthermore, it was observed that the research institute has been consistently increasing its productivity year after year. Among the 10 collaborative countries, 7 were from western developed countries, while the remaining 3 were from Asia. These Asian countries, including ARIES in Nainital, have emerged as leading research hubs in the region.

A study conducted by Sawai and Chavan (2019) [7] delved into the analysis of research productivity among LIS professionals from 2004 to 2013. The study utilized various methods including surveys, interviews, observations, and examination of curriculum vitae of the professionals. Several aspects were examined in this paper, including research productivity based on gender, language, types of research, authorship patterns, communication channels used for research, purpose of research, and financial support received for research.

Deshmukh and Khiste (2019) conducted a study that focused on the research contributions of Dr. Babashaeb Ambedkar Marathwada University, specifically in relation to the platform Research Gate. The researchers extracted data from the website researchgate.net, with the study's timeframe limited to December 2018. The findings revealed that 506 members of Dr. BAMU University had contributed to the research output on Research Gate. The study further explored the Research Gate scores, number of members, and publications of Dr. BAMU University across different departments, as well as the publications and Research Gate scores of individual faculty members.

In the study conducted by Khandare Dhanishta (2020), the focus was on analyzing the research productivity in the field of Library and Information Science (LIS) at Tilak Maharashtra Vidyapeeth, Pune. The research scholars in the department of LIS were surveyed to trace their research efforts from 2008 to 2018. The main objective of this research was to examine the theses submitted by these scholars for their doctoral degrees. The findings revealed that out of the 168 theses submitted, 160 were accepted by the university.

Yadav *et al.* (2020) conducted a scientometric examination on the research work produced by Mizoram University from 2004 to 2017. The study utilized the Indian Citation Index to collect the necessary data. It was found that the research scholars from the University of Mizoram contributed 265

research works between 2004 and 2007. The study identified a significant research output during the specified period, with the highest publication peak in 2015 and the lowest in 2004. Thivya Janen (2022) [6], an examination was made on the research output of the University of Jaffna in Sri Lanka from 2000 to 2019. The significance of universities in the research and development of a country cannot be overstated. To gain insights into publication trends, administrators, funding agencies, government bodies, and researchers rely on scientometric analysis. This particular study focuses on analyzing the articles published by the University of Jaffna during the specified time period. It aims to identify the growth rate of publications, the most prolific authors and their citation impact, the communication pattern in terms of document types, the countries where journals are published, the impact factor of these journals, and the extent of international collaboration.

Scope and Limitation of the Study

This study focuses on the scholarly literature of Department of Biotechnology at SPPU University. The literature includes publications from journals, books, and book chapters. The study's scope is confined to a specific timeframe of 2014 to 2023, spanning a period of 10 years.

Research Methodology

The objective of this study is to analyze the academic publications of the Department of Biotechnology at SPPU University. These publications include articles, books, and book chapters that are available on the SPPU research portal. The bibliographic data was obtained from the research portal, which is connected to the SPPU website and can also be found on the faculty research profile page. The data was collected on December 11, 2013, covering the period from 2014 to 2023. A total of 309 articles were downloaded and then analyzed using MS-Excel.

Data Analysis

In the Department of Biotechnology, there are a total of 10 faculties. The research data of all the faculty members is gathered using the research portal accessible on the SPPU website. The analysis of this collected data includes various parameters such as research productivity based on gender, types of research contribution, research productivity over the years, authorship patterns, citation analysis based on both year and author, and identification of barriers in research productivity.

1. Research Performance Based on Gender

An analysis of the publication status of faculty members in the Department of Biotechnology at SPPU in Pune is presented in Table No. 8.1, categorized by gender.

Table 1: Gender-Based Differences in Research Productivity

S. No	Gender	No. of Respondent	Publications	%
1	Male	07	267	86.40%
2	Female	03	42	13.59%
Totals		10	309	100%

Table 1 reveals that there is a total of 309 publications. The data shows that male librarians have published 267 publications, accounting for 86.40% of the total. On the other hand, female librarians have contributed 42 publications, representing 13.59% of the total. These findings suggest that male librarians exhibit higher research productivity compared to their female counterparts.

2. Types of Research Contribution

The analysis of research productivity in journals, book

chapters, and books by faculty members of the Department of Biotechnology at SPPU, Pune is presented in table number 2.

Table 2: Types of Research Productivity

S. No.	Types of Research Productivity	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
1	Journal Article	32	30	38	25	22	29	22	20	38	36	292	94.49%
2	Books	-	-	-	-	-	-	-	1	-	-	1	0.32%
3	Books Chapters	1	1	2	-	2	3	-	4	1	2	16	5.17%
	Total	33	31	40	25	24	32	22	25	29	38	309	100%

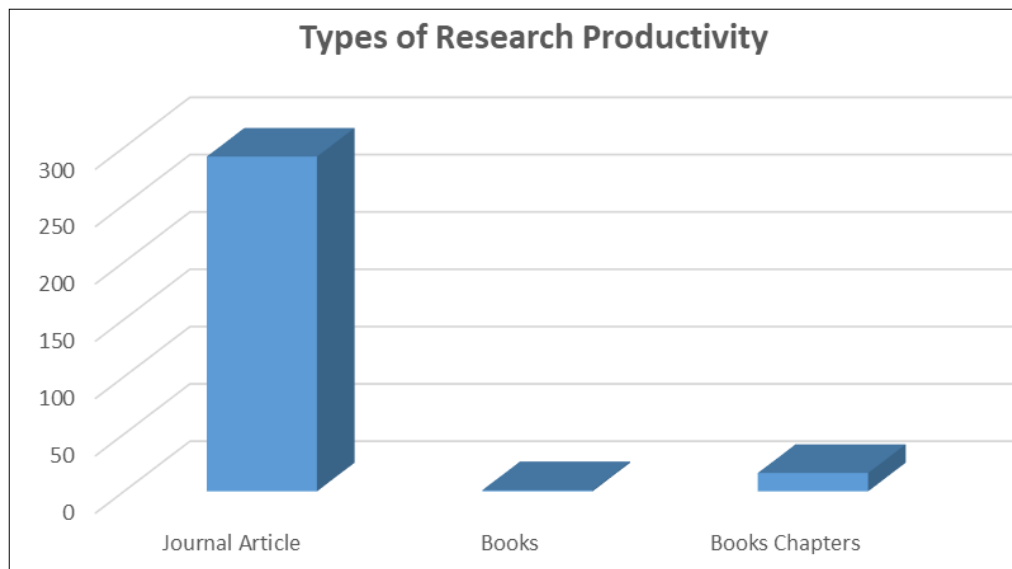


Fig 1: Types of Research Productivity

Table 2 and Figure 2 present the various types of research productivity in journals, book chapters, and books. A total of 309 research publications were recorded between the years 2014 and 2023. The majority of researchers have published their work in journals, accounting for 292 publications (94.49%). This is followed by book chapters with 16 publications (5.17%), and books with only 1 publication (0.32%).

3. Research Productivity by Year

The research performance of the Department of Biotechnology, SPPU Pune has been analyzed in table no. 3, focusing on the publications in journals, book chapters, and books categorized by year.

Table 3: Research Productivity by Year

S. No.	Year	Year Wise Research Performance	Percentages %
1	2014	33	10.67%
2	2015	31	10.03%
3	2016	40	12.94%
4	2017	25	8.09%
5	2018	24	7.76%
6	2019	32	10.35%
7	2020	22	7.11%
8	2021	25	8.09%
9	2022	39	12.62%
10	2023	38	12.29%
Totals		309	100%



Fig 2: Research Productivity by Year

Table 3 display that a total of 309 publications are present. The year 2016 witnessed the highest research productivity in terms of the number of publications. Researchers published 40 (12.94%) research papers in various journals, books, book chapters, and more. Conversely, 2018 and 2020 were the least research productive years for the faculty, with only 22 (7.11%) publications. This data indicates a year-by-year increase in faculty productivity, surpassing the previous years.

4. Authors and Publications List Ranking

Gacche R N emerges as the most prolific author, having contributed 91 (29.44%) research papers in various publications such as journals, book chapters, and books from 2014 to 2023. Following closely is Patil R.H., securing the second rank with 79 (25.56%) publications. Sakharkar A J claims the third rank with 41 (13.26%) publications, while Sharma Shilpy holds the fourth rank with 24 (7.76%)

publications. Gade W N secures the fifth rank with 22 (7.11%) publications. For a detailed ranking of the authors, please refer to table no. 4.

Table 4: Authors and Publications List Ranking

S. No.	Author Ranking	Name of the Authors	No. of Publications	Percentages %
1	1	Raju Nivarti Gacche	91	29.44%
2	2	Rajendra Harischandra Patil	79	25.56%
3	3	Amul J Sakharkar	41	13.26%
4	4	Shilpy Sharma	24	7.76%
5	5	Gade W N	22	7.11%
6	6	Amit Roy	19	6.14%
7	7	Smriti Pk Mittal	16	5.17%
8	8	Vivek Vaish	11	3.55%
9	9	Gunderao Hanumantrao Katavte	4	1.29%
10	10	Tanushree Banerjee	2	0.64%
		Total	309	100%

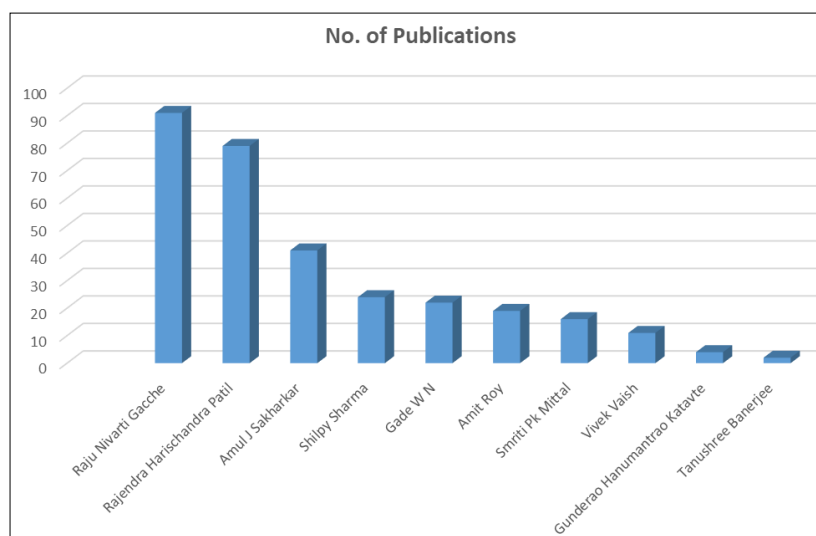


Fig 3: Authors and Publications List Ranking

5. Top Cited Paper

Table.5 gives information about top-cited publications. A total of 309 documents were examined in this study. It was found that the title "Cost effective technologies and renewable substrates for biosurfactants' production." by Patil Rajendra

Harischandra has received highest 228 citations. Furthers, data informs that all the top-cited publications published in the journal other than, book, book chapter and conference proceedings. However, indebt evaluations of paper and citation shows that these highly cited articles were written.

Table 5: Top Cited Paper

S. No	Authors	Title	Year	Source title	Cited by (wos)
1	Rajendra Harischandra Patil	Cost effective technologies and renewable substrates for biosurfactants' production.	2014	Frontiers in Microbiology,	228
2	Raju Nivarti Gacche	Angiogenic factors as potential drug target: Efficacy and limitations of anti-angiogenic therapy.	2014	Biochimica et Biophysica Acta-Reviews on Cancer	133
3	Amul J Sakharkar	Potential role of adolescent alcohol exposure-induced amygdaloid histone modifications in anxiety and alcohol intake during adulthood.	2014	Neurobiology of Disease	116
4	Rajendra Harischandra Patil	Antileishmanial drug discovery: comprehensive review of the last 10 years.	2015	RSC Advances,	102
5	Amul J Sakharkar	A role for histone acetylation mechanisms in adolescent alcohol exposure-induced deficits in hippocampal brain-derived neurotrophic factor expression and neurogenesis markers in adulthood.	2016	Brain Structure and Function	76
6	Rajendra Harischandra Patil	Biosurfactant/s from Lactobacilli species: Properties, challenges and potential biomedical applications.	2016	Journal of Basic Microbiology,	68
7	Raju Nivarti Gacche	Redundant Angiogenic Signaling and Tumor Drug Resistance.	2018	Drug Resistance Updates	66
8	Vivek Vaish	Downregulation of PI3-K/Akt/PTEN pathway and activation of mitochondrial intrinsic apoptosis by Diclofenac and Curcumin in colon cancer.	2015	Molecular and Cellular Biochemistry	63

9	Gade W N	Multiple Roles of Biosurfactants in Biofilms.	2016	Current Pharmaceutical Design	49
10	Vivek Vaish	The Role of IL-33/ST2 Pathway in Tumorigenesis.	2018	International Journal of Molecular Sciences	46
11	Gade W N	Biomaterialized Anisotropic Gold Microplate–Macrophage Interactions Reveal Frustrated Phagocytosis-like Phenomenon: A Novel Paclitaxel Drug Delivery Vehicle.	2014	ACS Applied Materials and Interfaces	46
12	Smriti Pk Mittal	Andrographolide protects liver cells from H ₂ O ₂ induced cell death by upregulation of Nrf-2/HO-1 mediated via adenosine A _{2a} receptor signalling.	2016	Biochimica et Biophysica Acta (BBA)-General Subjects	44
13	Shilpy Sharma	A Glutathione Activatable Ion Channel Induces Apoptosis in Cancer Cells by Depleting Intracellular Glutathione Levels.	2020	Angewandte Chemie	39
14	Gunderao Hanumantrao Katavte	Synthesis, antimicrobial evaluation, and molecular docking studies of novel chromone based 1, 2, 3-triazoles.	2017	Research on Chemical Intermediates	36
15	Shilpy Sharma	miRNAs: early prognostic biomarkers for Type 2 diabetes mellitus	2015	Biomarkers in Medicine	35
16	Tanushree Banerjee	Formulation of nanotized curcumin and demonstration of its antimalarial efficacy.	2014	International Journal of Nano medicine	28
17	Amit Roy	Copper salicylaldehyde (CuSAL) imparts protective efficacy against visceral leishmaniasis by targeting Leishmania donovani topoisomerase IB.	2017	Experimental Parasitology	18
18	Amit Roy	Topoisomerase I as a biomarker: Detection of activity at the single molecule level.	2014	Sensors	18
19	Smriti Pk Mittal	miR-320a regulates erythroid differentiation through MAR binding protein SMAR1.	2013	International Journal of Biochemistry and Cell Biology	17

6. Author Wise Citation

Table 6 provides valuable information regarding the maximum citation received by author publications. The researchers studying a total of 309 documents to gather their

findings. The analysis disclosed that Patil R H received the highest number of citations, specifically 905 citations according to the Web of Science (WoS) and Gacche Raju Nivaruti received maximum Google scholar citation 635.

Table 6: Author wise citation

S. No.	Author Wise Citation	WoS	GS
1	RajendraHarischandraPatil	905	503
2	Raju NivartiGacche	708	635
3	Amul J Sakharakar	604	
4	VivekVaish	237	185
5	Gade W N	184	263
6	Shilpy Sharma	139	11
7	SmritiPk Mittal	122	27
8	Amit Roy	53	94
9	Tanushree Banerjee	38	7
10	Gunderao Hanumantrao Katavte	27	20

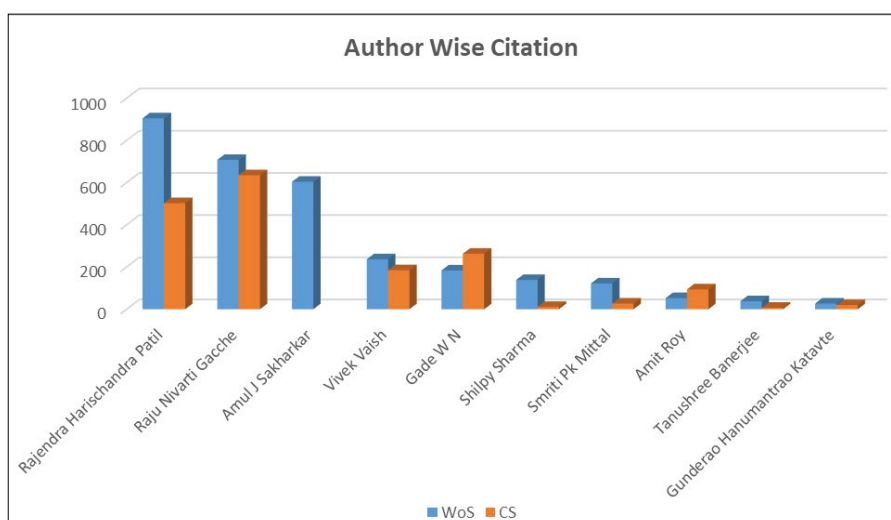


Fig 4: Author wise citation

Key Findings

1. Out of the total publications, male librarians have contributed to 267 (86.40%) publications, whereas female librarians have published 42 (13.59%) publications.
2. The majority of researchers have chosen to publish their research papers in journals, accounting for 292 (86.40%) publications. This is followed by book chapters with 16 (5.17%) publications and books with 0.32%.
3. In 2016, researchers published a total of 40 (12.94%) research papers across various mediums such as journals, books, and book chapters.
4. Gacche R M stands out as the most prolific author, having contributed 91 (29.49%) research papers in journals, book chapters, and books during the period of 2014-2023.
5. The paper authored by Patil R.H. has received the highest number of citations in the Web of Science (WOS), with a total of 905 citations.

Conclusion

The current investigation relies on the curriculum vitae and SPPU website research portal of the biotechnology department's faculty members at SPPU Pune. It encompasses an analysis of productivity based on gender, types of research contributions, productivity trends over the years, author and publication rankings, writing and publication statuses, as well as year-wise and author-wise citation counts.

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