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A Scientometric Analysis of Doctoral Theses in Biological Sciences of Doctor Harisingh Gour Vishwavidyalaya, Sagar, India

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ABSTRACT

Purpose: This study analyzes 259 doctoral theses in Biological Sciences intending to ascertain the annual distribution of doctoral theses categorized by core subjects v/z research trends, researchers' gender, and ranking of single (solo) and collaborative supervisors in Biological sciences subjects' coverage of Zoology and Botany in DHSGVV.

Design/methodology/approach: This study utilized data collected from the total number of 259 PhD theses during from 2000 to 2023 in the field of Biological Sciences including disciplines botany with total 144 and zoology with total 155 doctoral dissertation. The raw data for this study is derived from the Shodhganga e-theses in print format and offline data obtained from the available doctoral theses in the field of biological sciences in Jawaharlal Nehru Central Library at DHSGVV. The data were organized and analyzed using quantitative statistical approaches with MS Excel tables, using (SPSS) Statistical Package for Social Sciences.

Findings: The study analyzed a total of 259 doctorate theses, comprising 115 theses in zoology and 144 theses in botany for the period from 2000 to 2023. The data reveals that the year 2012 recorded the highest number of PhDs published in Zoology (16.52%), while the year 2002 exhibited the highest PhD output in Botany (11.11%). Contemporary Research Trends Determine the total of 115 PhD outputs in Zoology categorized by core subjects, with the majority of study focusing on "Biodiversity", "Toxicity", "Teleost", and "Freshwater Fish". The research output in botany subjects includes the following core subjects, like "Medicinal Plants." The highest percentage of doctoral theses has been completed by "Bhide, Mangla," who ranks first with a total of 19 (16.52%), followed by Subodh Kumar Jain, whose research output totals 16 (13.91%), and third is held by "Janak Dulari Ahi" with a total number of 12 (10.43%) in Zoology. In botany, the highest research output in terms of supervised doctoral theses is by "Rai, A. N.," who ranks first with a total of 19 (13.19%), followed by "Deepak Vyas" with a research output of 16 (11.11%), securing the second rank.

Practical implications: The study is an analysis of doctoral theses from 2001 to 2023, with a total number of 259 doctoral theses. Zoology total 115 and total 144 theses in botany grounded in contemporary research trends and quantitative analysis within the biological sciences

Originality/value: The originality of this article is to bring-in the new invented research for biological sciences, pivotal in directing future topic selection for researchers and advancements in the scientific domain. The study is very innovative research for the field of biological sciences, including subjects Zoology and Botany at Doctor Harisingh Gour Vishwavidyalaya Central University in Sagar, Madhya Pradesh, India.
Paper type - Research paper

KEYWORDS: Current Research Trends; Doctoral Theses year wise; Subject wise; Core subjects wise Research trends; Supervisors Solo & Co-Supervisors wise; Male & Female Researchers wise research output; Top Ranking of Supervisors in Zoology & Botany in DHSGVV.

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INTRODUCTION

Scientometrics is a significant area of library and information science study and offers a distinct method for managing scientific knowledge and tracking analyzing information resources. "Scientometrics is a discipline, which uses statistical and computational techniques in order to understand the structure and dynamics of science. According to Beck (1978) scientometrics is defined as the quantitative evaluation and inter-comparison of scientific activity, productivity and progress. Scientometric analysis is the quantitative examination of a subject's development using statistical methods and instruments, as well as scientoometric indicators. The study and assessment of patterns in all types of published information is known as scientometrics. It was created to characterize research pertaining to the measurement of written communication. According to Nalimov and Mulchenko (1969).

REVIEW OF LITERATURE

Meyer, M., & Vergnaud, F. (2024) conducted a study on analyzes principal themes addressed by scientists in 14,739 scientific articles published from 1990 to 2022. The study categorized the articles into four intervals: 1990-2011, 2012-2015, 2016-2018, and 2019-2022. The research found that biochemical research methods, biology, and biotechnology and microbiology collectively account for almost three-quarters of the scientific domains, with the semantic domains evident in the lexical analysis. Huang, S., et all. (2023) investigate the study of climate effects of irrigation research trends and knowledge structure. They analyzed the top 30 most referenced works from 1993 to 2022, with the United States leading with 30.23% citations. The study found an average citation frequency of 25.67 per article, with an exponential distribution in annual publication volume. Biswas, R., Roy, T., & Modak, S. (2021) analyzed 23 doctoral theses in Science and Social Sciences submitted to ICFAI University, Dehradun from 2012 to 2020. It analyzed form-wise, authorship pattern, geographical area-wise, and country-wise authors. The results showed that the study was cited most science and social science, with 4809(53.56%) journals articles citations of the data, followed by 3474(38.69%) books citation of the study. The study is indicating journal usage as a major information resource. Bala, S. and Singh, J. (2020) conducted a study on analyzing the study of employs a research approach involving citation analysis of a total of 7,624 citations included in total 42 PhD theses on Horticulture Science. Major findings: of this

study is predominant source of information was Articles, accounting for 5,761(75.56%) citations, followed by Books with 532(6.97%) citations and Conference/Seminar proceedings with 331(4.34%) citations. This study indicates that the highest number of journal articles, with 1972(34.23%) citations, is contributed by India, followed by the USA with 760 citations (13.19%) major findings of the study. Pawar B. V., (2017) A study analyzed 15,632 citations from 75 botany PhD theses submitted to Swami Ramanand Teerth Marathwada University, Nanded, from 1997 to 2015. The study found Evolution was the most popular, followed by Genetics. Springer and Elsevier were the most preferred publications, with Psychopathology being the most frequently used source of knowledge.

OBJECTIVES OF THE STUDY

- To identify the year-wise research output of doctoral theses in Zoology and Botany subjects;
- To find out the subject-wise total Research output;
- To examine the Core subject-wise current research trends in the field of Botany and Zoology;
- To explore the researchers, gender-wise analysis of doctoral theses;
- To identify the single (Solo) & joint supervisors' wise analysis of PhD theses;
- To find out the supervisors-wise ranking of the top majority research output.

SCOPE AND LIMITATION OF THE STUDY

For the present study, "A Scientometric Analysis of Doctoral theses in Biological Sciences of DHSGVV, Sagar, India" has been selected. The data has been collected from e-shodhganga plateform and JLN library for departmental library in Botany and Zoology. There are total 259 theses of biological sciences under botany and zoology disciplines. Statistical tolls like tabular presentations various data use to present study effectively. The study's breadth and limitations are essential for modern innovations and the selection of educational materials, offering scholars and educators insightful guidance on the most current scientific research trends in Biological sciences.

RESEARCH METHODOLOGY

The data collected is from both online and offline theses from Shodhganga e-platform (https://shodhganga.inflibnet.ac.in/) and from hardcopy print theses available at Jawahar Lal Nehru Central Library DHSGSVV as on date 13/05/2024. The doctoral theses are from biological sciences, including disciplines of Zoology and Botany, during 2000-2023. It focuses on total number of 259 doctoral theses including subjects of Botany with 144 and Zoology with total 115 doctoral dissertations from DHSGVV. The data present in MS Excel, analysis and interpretation in tabular form using SPSS software (Statistical Package for the Social Sciences), etc.

DATA ANALYSIS & INTERPRETATIONS

Table 1: Year-Wise Distribution of Doctoral Theses in the Field of Botany and Zoology

Sl. No.	Year	Number of Ph.D. theses and % in Zoology	Number of Ph.D. theses and % in Botany
1	2000	3(2.61)	3(2.08)
2	2001	2(1.74)	1(0.69)
3	2002	9(7.83)	16(11.11)
4	2003	1(0.87)	5(3.47)
5	2004	2(1.74)	5(3.47)
6	2005	8(6.96)	5(3.47)
7	2006	8(6.96)	11(7.64)
8	2007	4(3.48)	12(8.33)
9	2008	5(4.35)	11(7.64)

10	2009	5(4.35)	2(1.39)
11	2010	4(3.48)	12(8.33)
12	2011	7(6.09)	11(7.64)
13	2012	19(16.52)	5(3.47)
14	2013	11(9.57)	10(6.94)
15	2014	0(0.00)	1(0.69)
16	2015	1(0.87)	3(2.08)
17	2016	2(1.74)	1(0.69)
18	2017	4(3.48)	8(5.56)
19	2018	2(1.74)	1(0.69)
20	2019	4(3.48)	2(1.39)
21	2020	2(1.74)	7(4.86)
22	2021	2(1.74)	7(4.86)
23	2022	5(4.35)	4(2.78)
24	2023	5(4.35)	1(0.69)
TOTAL		**115(100.00)**	**144(100.00)**

Table No.1 Examine the study, encompassing a total of 259 doctoral theses, which revealed a year-wise research output of 115 theses in Zoology and 144 theses in Botany awarded by DHSGVV, covering analyses of these subjects from 2000-2023. Data analysis reveals that the year 2012 recorded the highest number of PhDs awarded in zoology with 19 (16.52%), while the lowest in 2003 and 2015 with 1 (0.87%). In terms of research output in botany, the year 2002 exhibited the highest output, with 16 (11.11%) doctoral theses, whereas the lowest output occurred in 2001 and 2016. From 2018 to 2023, the whole research production in the Botany topic at DHSGVV consists of a singular doctoral thesis, amounting to only one (0.69%) research output.

Table 2: Subject-Wise Research Output in the Field of Zoology and Botany

Sr. No.	Subject	Total number of Doctoral Theses	%	Rank
1	Botany	144	55.59	1
2	Zoology	115	44.40	2
Total		**259**	**100.00**	

Table 2 The subject-wise analysis of the study reveals the distribution of doctorate theses across zoology and botany. In this study analysis, out of a total of 259 PhD theses, 144 (55.59%) pertain to botany, while 115 (44.40%) are in zoology. This analysis reveals that the largest total number of doctoral theses given is in the field of botany at DHSGVV.

Table 3: Current Research Trends Core Subjects -Wise Research Output in Zoology

Sr. No	Categories of Core Subject (Area-wise)	Research Output	Percentage (%)	Rank
1	Biodiversity, Toxicity, Teleost, Nature Fresh Water Fish	23	20.00	1
2	Albino Mice & Rats	9	7.83	2
3	Plant Products	9	7.83	2
4	EVS, Population Density	6	5.22	3
5	Breast, Anti-Cancer Drug	6	5.22	3
6	Soil Ecosystem	5	4.35	4

7	Microorganisms Producing	4	3.48	5
8	Mitochondrial Biogenesis	3	2.61	6
9	Brain Disorders	3	2.61	6
10	Forest Reserve	3	2.61	6
11	Eco- Biology	2	1.74	7
12	PCR Based Biomarker System	2	1.74	7
13	Amino Acids	2	1.74	7
14	Mitochondrial Biogenesis	2	1.74	7
15	Poultry Birds	2	1.74	7
16	Microbial Toxins	2	1.74	7
17	Reproductive Biology	2	1.74	7
18	Phytochemical Supplementation	2	1.74	7
19	Hoplocerambyx Spinicornis	2	1.74	7
20	Disaster Management	1	0.87	8
21	Others	25	21.74	
Total		**115**	**100.00**	

This table 3 shows that the current research trends indicate a total of 115 research outputs in zoology, with the majority focused on the main subjects of "biodiversity, toxicity, Teleost, and Freshwater Fish." The first rank is held by 23 (20.00%), followed by "Albino Mice & Rats" in second rank with a total of 9 (7.83%), and "EVS, Population Density" occupies the third rank with a total of 6 (5.22%) research outputs in this study.

Table 4: Current Research Trends Core Subjects Wise Research Output In Botany

Sr. No	Categories Core Subject Botany	Research Output	Percentage (%)	Rank
1	Medicinal Plants	21	14.58	1
2	Dry Deciduous Forests & Flora	13	9.03	2
3	Fungal Diseases	9	6.25	3
4	Plants Diversity	8	5.56	4
5	Van, Phyto parasitic, Pathogenic Fungi	7	4.86	5
6	Ecological Studies	6	4.17	6
7	Water Supply	5	3.47	7
8	Cancer Anti-Oxidant and Anti-Bacterial Properties	5	3.47	7
9	Nutrient Dynamics	5	3.47	7
10	Wild Animals	5	3.47	7
11	Mycotaxonomic Survey	4	2.78	8
12	Cultivation Technology	3	2.08	9
13	Vegetation Ecology	3	2.08	9
14	Pharmacological Evaluation	3	2.08	9
15	Phyto- Pharmacological	3	2.08	9
16	Tiger Reserve	3	2.08	9
17	Ethno-Botanical	2	1.39	10
18	Mycotaxonpmic Investigation	2	1.39	10
19	Microbial Interaction	2	1.39	10
20	Crude Drugs	2	1.39	10
21	Bioactive Compounds	1	0.69	11
22	Others	32	22.22	
Total		**144**	**100.00**	

Table 4 indicates that, among the total number of 144 research outputs in Botany, the top majority of research has been conducted in the core subject of "Medicinal Plants" with first rank. Followed by "Fungal Diseases" with 21 (14.58%) research outputs and "Dry Deciduous Forests & Flora" in second place with 13 (9.03%) research completed, and "Fungal Diseases" in the third rank with 9 (6.25%) in the subject of Botany.

Table 5: Researcher (Gender-Wise) Research Output of Doctoral Theses in Zoology

Sr. No.	Gender	Number of Researchers and Percentage of Zoology	Number of Researchers and Percentage of Botany	Rank
1	**Male**	62(53.91%)	83(57.64%)	1
2	**Female**	53(46.09%)	61(42.36%)	2
Total		**115(100.00)**	**144(100.00)**	

Table 5 Analyze the study, which is a total of 115 doctoral theses in gender-wise research output in researchers of doctoral theses in the field of zoology and botany. The researcher's wise analysis found that the majority of Zoology is a total number of 62 (53.91%), and Botany is a total number of 83 (57.64%), with the first rank of the male researcher. Zoology female researchers have done a total of 53 (46.09%) wise research, and botany is a total of 61 (42.36%), which is the lowest research output. This study found that the gender-wise research performance of most research has been done by males, is the maximum research has been done in the fields of zoology and botany of doctoral theses awarded by DHSGVV.

Table 6: Supervisors (Solo) and Co-Supervisors -Wise Analysis of Doctoral Theses in Zoology

Sr. No.	Supervisors	Research output and % of Zoology	Research output and % of Botany	Rank
1	Supervisors (solo)	88(76.52%)	116(80.56%)	1
2	Co- Supervisors	27(23.48%)	28(19.44%)	2
Total		**115(100.00)**	**144(100.00)**	

Table 6 shows this table maximum number of Zoology with 88 (76.52%) and Botany with 116 (80.56%). In this study, research output has been completed by supervisors (solo), and only 27 (23.48%) research outputs in Zoology and Botany are a total number of 28 (19.44%) that have been completed by joint supervisors. The study has found out the solo guide is preferred by most of the research scholars doing their research work in zoology and botany at DHSGVV.

Table 7: Top Ranking for Supervisor-Wise Research Output in the Field of Zoology

Sr. No.	Name of the Supervisors	Research Output	Percentage (%)	C. F.	C. F. (%)	Rank
1	Bhide, Mangla	19	16.52	19	16.52	1
2	Subodh Kumar Jain	16	13.91	35	30.43	2
3	Janak Dulari Ahi	12	10.43	47	40.87	3
4	D. K. Saraf	9	7.83	56	48.70	4
5	U.S Gupta	8	6.96	64	55.65	5
6	Mrs. S. Sahai	8	6.96	72	62.61	=5
7	Sumita Banerjee	7	6.09	79	68.70	6
8	Yadav, Shweta	4	3.48	83	72.17	7
9	Versha Sharma	3	2.61	86	74.78	8

10	Rashmi Srivastava	3	2.61	89	77.39	=8
11	Others	26	22.61	115	100.00	
	Total	**115**	**100.00**			

Abbreviation: T.C.- Total citation, C.F. - Cumulative frequency, C.F. (%) - Cumulative frequency percentage

Table 7 shows table research output in supervisors wise, top-ranking-wise research that has been completed by throwing the is based on the total number of 115 doctoral dissertations awarded in the field of Zoology. The highest doctoral theses completed under supervision by "Bhide, Mangla" rank first, with a total number of 19 (16.52%), followed by under supervision Subodh Kumar Jain, with the 2nd rank research output being a total number of 16 (13.91%), and the 3rd rank is followed by Janak Dulari Ahi under supervision, who completed doctoral theses in total 12 (10.48%), and followed by Versha Sharma and Rashmi Srivastava ,both under supervision, which is the lowest research output, with 3 (2.61%) is eight ranks of this study in DHSGSVV.

Table 8: **Top Ranking for Supervisor- Wise Research Output in the Field of Botany**

Sr. No.	**Name of the Supervisors**	**Research Output**	**Percentage (%)**	**C. F.**	**C. F. (%)**	**Rank**
1	Rai, A. N.	19	13.19	19	13.19	1
2	Deepak Vyas	16	11.11	35	24.31	2
3	Mehta, Pradeep	15	10.42	50	34.72	3
4	Bajpai, S. P.	11	7.64	61	42.36	4
5	Sahu, T. R	11	7.64	72	50.00	4
6	A.K. Kandya	10	6.94	82	56.94	5
7	Mehta, Archana	9	6.25	91	63.19	6
8	Khare, P K	8	5.56	99	68.75	7
9	M. L. Khan	7	4.86	106	73.61	8
10	Jaishree Dubey	6	4.17	112	77.78	9
11	Others	32	22.22	144	100.00	
TOTAL		**144**	**100.00**			

Abbreviation: T.C.- Total citation, C.F. - Cumulative frequency, C.F. (%) - Cumulative frequency percentage

Table No. 8 shows this table supervisor-wise research output in top-ranking-wise research completed by throw is based on a total number of 144 doctoral dissertations awarded in the field of Botany. The highest doctoral theses have been completed under the supervision by "Rai, A. N." first rank with a total number of 19(13.19%) followed by "Deepak Vyas" under supervision completed doctoral theses is total number of 16(11.11%) 2nd rank and followed by "Jaishree Dubey" under supervision is lowest doctoral theses completed is total number of 6(4.17%) is nine ranks of this study in field of Botany in DHSGSU (M. P.) India.\

MAJOR FINDINGS

- The analysis of year-wise doctoral theses from 2000 to 2023 at DHSGVV revealed a total of 259 theses, comprising 115 in Zoology and 144 in Botany. Data analysis reveals that the year 2012 recorded the highest number of PhDs awarded in Zoology, totaling 19 (16.52%), while the lowest was in 2003 and 2015, with only one (0.87%) research output. In terms of research output in Botany, the peak occurred in 2002, with 16 (11.11%) doctoral theses, whereas the lowest output

was observed in 2001, 2014, 2016, 2018, and 2023, each yielding only one with (0.69%) doctoral thesis from DHSGVV.

- The study reveals the distribution of doctoral thesis subjects, specifically Zoology and Botany, from a total of 259 PhD theses. Botany comprises 144 theses (55.59%), while Zoology accounts for 115 theses (44.40%). This study indicates that the biggest overall number of doctoral theses pertains to the topic of Botany.
- The bulk of completed doctoral research outputs in zoology core subjects' wise totals 115, with most PhD research focusing on "Biodiversity, Toxicity, Teleosts, Nature and Fresh water Fish." The first rank is held by 23 (20.00%), followed by "Albino Mice & Rats" and Plant Products in second rank with a total of 9 (7.83%). "EVS, Population Density" occupies the third rank with a total of 6 (5.22%) research outputs from this subject.
- The examination of research trends find out by Botany core subject reveals that the majority of research has been conducted in the area of core subjects is "Medicinal Plants" 21(14.58%) is first rank and second rank is "Dry Deciduous Forests & Flora" with total number 13(9.03%) and "Fungal Diseases" is found that the 3rd rank with total number 9(6.25%) research output of the study in field of.
- Found that the gender-wise analysis of total 259 doctoral theses in Zoology and Botany, revealing that male researchers performed the majority of research with first rank 62(53.91%) in Zoology and 83(57.64%) in Botany, while female researchers 53(46.09%) in Zoology and contributed with total number of 61(42.36%) in subject of botany in second rank of the study. The study found that the gender wise research performance most research have done by male is the maximum research have done field of Zoology and Botany.
- Found that the Supervisors (solo) and Co-Supervisors wise analysis reveals the top majority of research outputs in Zoology is 88(76.52%) and in Botany is 116(80.56%), with these outputs primarily completed by solo supervisors. Conversely, only 27 (23.48%) research outputs in Zoology and a total of 28(19.44%) in Botany were completed under joint supervision. The study revealed that the majority of research scholars in Zoology and Botany at DHSGVV favor the solo guide approach for their research endeavors.
- Found that the highest number of doctoral theses completed under the supervision of "Bhide, Mangla" ranks first, with a total of 19(16.52%) following by second place is "Subodh Kumar Jain" with a total of 16(13.91%) and "Janak Dulari Ahi" ranks third, having supervised 12 theses (10.43%). The lowest research output is attributed to "Versha Sharma" and "Rashmi Srivastava" both under supervision is lowest research output is total of 3(2.61%) is eight ranks of this study.
- Found that is field of botany is the highest doctoral theses have been completed under supervision by "Rai, A. N." first rank with a total number of 19 (13.19%) followed by "Deepak Vyas" under supervision completed doctoral theses in total number of 16(11.11%) 2nd rank and followed by "Jaishree Dubey" under supervision is lowest doctoral theses completed is total number of 6(4.17%) is nine ranks of this study in field of Botany.

CONCLUSION

Scientometric analysis research work objectively illustrates the distribution of doctorate theses in biological science disciplines, quantities of academic research trends output, historical knowledge progression, and prospective advancements in research trends within the biological sciences. The present study conducted from 2000-2023 covered doctoral theses with a total number of 259 research trends output in this study. In this study, conclusions and suggestions are very important in helpful research for scholars, scientists, and professors. Various research trends identify difficulties for future directions and guide new researchers in doing productive research while preserving the knowledge of seasoned researchers' fields in biological sciences.

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