

Research Productivity of Botany Department in Lucknow University, Lucknow, Uttar Pradesh, During 1921-2007: A Study

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Abstract

This paper examine research productivity of Botany department PhD theses literature emanating from Lucknow University over 224 theses from 1921-2007. Data has been collected from Botany Department, Lucknow University, and analyzed to examine the chronological growth of research contribution of Department during study period. Total 224 theses scattered in 27 subdivisions of Botany branch. This paper also presents year wise distribution of theses, discipline wise, branch wise ranking of Botany, and growth of literature, predominant research domains, growth and direction of Botany Research etc over a period of 88 years. Botany department research output seems that to concentrate in the area of “Genetics” and other “branch of Botany”. This study identified that the highest number of theses submission was 93 during 2007-1998 and highest 22 number of theses were submitted in Genetics branch of Botany. We also examine the relative influence of the disciplinary context and attributes of scholars on research productivity.

Keywords: Subject collaboration, Research productivity; Biology.

Introduction: Today we are passing through an era which can aptly be called as an era of knowledge explosion and it is becoming increasingly difficult for an individual scientist or research worker or a specialist to keep himself a breast in informed of the latest through in his field of specialization.

Botany is the study of plant and branch of life sciences. It is the major fields of Biology, together with zoology (the study of animals) and microbiology (the study of bacteria and viruses). Specializations with in the field of botany include the study of mosses, Algae, lichens, ferns and fungi etc. Other specialties in botany include plant physiology, photosynthesis, respiration and plant nutrition, Plant pathology, Paleobotany, ecology, Agrology, Bryologist, Plant Breeding and Cytogenetic, Mycology and Plant Pathology, Plant virology etc¹.

Theophrastus is called the “Father of botany”, because of his two Surviving works on plant studies. The first step in the history of Botany would have been taken with the empirical plant lore passed from generation to generation in the oral traditions of our Paleolithic hunter-gatherer ancestors. The written record of plants dates from the Neolithic Revolution as the domestication of plants and animals was established in settled agricultural communities around the world about 2,500 to 10,000 years ago. Human intervention in the cultivation of plants has contributed equally to plant development.

Various Branches of Botany:

- **Taxonomy:** Identifying, naming and classifying the living.
- **Bryology:** diversified aspects of Bryophytes.
- **Lichenology:** Post-harvest pathology and other aspects.
- **Taxonomy and Morphology:** morphology of several living plants.
- **Morphology:** study of form and external structure of organisms.
- **Anatomy:** study of internal structure of organism is called.

- **Histology:** study of details of tissue structure.
- **Hydro Biology:** aspects of hydrobiology and pollution.
- **Cell Biology:** study of structure, function, reproduction, history of cells.
- **Exobiology:** study of the kind of life that may exist in outer space.
- **Genetics:** The study of heredity and variation is called.
- **Ecology:** interrelation between organisms and their environment.
- **Physiology:** study of process and function associated with plants.
- **Molecular Botany:** study, physico-chemical organization of biomolecules.
- **Embryology:** study, fertilization of the egg, and development of the embryo.
- ☐ **Biophysics:** Study of plant activities on the basis of principles of physics.
- ☐ **Microbiology:** Study of microorganisms. It includes the study of viruses, bacteria, micro fungi, microalgae and protozoa in relation to plants.
- ☐ **Molecular biology:** Study of biochemistry at molecular level.
- ☐ **Palynology:** Study of pollen grains in relation to taxonomy and evolution etc.
- ☐ **Biometrics:** Statistical analysis of different results of biological experiments.
- ☐ **Agonomy:** Is the science which deals with the crop plants.
- ☐ **Pharmacognosy:** Is the branch of science dealing with the medicinal plants.
- **Environmental science:** The study of continuous genetic adaptations of population of organisms to the environment.
- **Cytogenetic and Plant Breeding:** cytotaxonomy, mutation breeding, biometric genetics
- **Palaeobiology (Paleobotany and Palaeozoology):** The study of origin, growth and structure of organisms of the past with the help of their fossil-forms is known as referring to the study of fossil plants and animal respectively.
- ☐ **Horticulture:** Is the science which deals with the study of flowering and fruiting plants.
- ☐ **Genetic Engineering:** Adding, removing or repairing part of genetic material, thereby changing the phenotype of organism as desired².

About the Department: Lucknow University established in 1921 saw the golden dawn on the horizon of Lucknow as the city of Nawabs was gifted Lucknow University and Botany Department. Right from its beginning the Department had devotional patronage of luminary like Professor Birbal Sahni. At present this Department has a very strong faculty comprising of 10 Professors, 13 Readers and 2 Lecturers, representing nearly all the specialties of Botany. The Department offers B.Sci, M.Sci, M.Phil and Ph.D. course in Botany. The Ph.D programme is extended to Lucknow based research institutes of the CSIR, DST, ICAR, and the ICGEB at New Delhi and the IRRI, Manila. The department also offers Refresher Courses for in-service teachers of Botany from different Universities and their associated colleges. In 1979, the Department was identified as UGC Department for special Assistance. The Department is now identified as the DST-FIST sponsored Department of Botany. The research output has been published in international and national reputed journals. Today the department occupies a proud position for evolving a unique blend of the traditional and modern Botany/Life Science teaching and research.

Objectives of the Study: The following objectives of this study:

- To examine the year wise distribution of the theses in Botany department
- To find out the subject area in which the contributions have been made.
- To determine the total contribution of the Lucknow University in Botany research.
- To find out the most used Botany branch for research.

Literature Review:

Nandi & Bandyopadhyay (2013) carried a Scientometric dimension of research productivity of the Botany department produced 739 articles with during 1976-1980 with 160 doctoral theses. Among the

top ranking journals publishing the papers are from India with 373 (50.47 %) publications followed by Germany with 61(8.29 %) publications, china with 53 (7.17 %) publications and Netherlands with 45(6.09 %) publications. **Suma & Pillai (2013)** studied 914 research papers have been published by 137 Ph.D scholars during the period 2001-2010. That majority of the theses 107 were in chemistry and analyzed maximum numbers of theses 21 were submitted under the guidance of Dr. G.Vijay **Olatokum (2009)**, reveled citation from 40 doctoral theses submitted between 2000 and 2007. This study discovered that most of the cited sources were journals-well over 50% of the total citations for PhD works were to journals. Another striking agreement of this study is that only about 12 to 13 titles were needed to cover 50% of the journal citations. This study shows that about 80% of the total journals cited were actually from the basic sciences. **Kumar & Shah (2007)** analyzed 1429 research papers comprising 1117 articles and 312 short notes published in fifteen volumes, published for the year 1989-2003 in Indian journal of entomology. They analyzed year wise distribution, length of articles, authorship pattern and calculate collaboration coefficients and most prolific contributors. **Vial & Reddy (1996)** studied the trend in authorship pattern and collaborative research in zoology with a sample of 19,323 journal citations; It is observed that the proportion of single authorship is likely to be insignificant after the year 2030. The degree of collaboration in research is 0.75 in zoology as a whole. **Maheswarappa & Lal (1993)** reported the results of a Bibliometric analysis of 4136 citations of articles published in the Indian journal of genetics and plant breeding and prepared a rank list of the 60 most cited primary periodicals. He has also illustrated the contribution of Indian and foreign theses and the authorship pattern revealing that multi authored papers were more in practice. **Maheswarappa & Prakash (1982)** analyzed 2726 references from fifteen doctoral theses in botany during 1973-1980. They found out the bibliographic forms used, ranked list of core journals, self citation pattern, obsolescence, etc. the average self-citation rate was 3.22%. The median number of references per document was 52 (99% CI 47-55); the median percentage of journal articles cited was 55%, with a median age for journal references of 9 years.

Methodology: With the objective in hand the information is collected from Botany department and the research section of Tagore Central Library, Lucknow University. The information regarding research Scholars and the topic were gathered from the Botany department. Each thesis was analyzed thoroughly in terms of the demographic characters, year of submission, subject area, and guide, geographical area etc covered. The data gathered were analyzed using descriptive statistics, **statistical method, tables and percentages.**

Analysis and Interpretation of Data:

Table-1: Decade wise distribution of theses submitted in Botany Department from - 2007- 1921

Years	Total No. of Thesis	Percentage
2007-1998	93	42 %
1997-1988	34	15 %
1987-1978	44	20 %
1977-1968	29	13 %
1967-1958	18	8 %
1957-1948	04	2 %
1947-1938	01	0 %
1937-1928	01	0 %
1927-1921	0	0 %
TOTAL	224	100 %

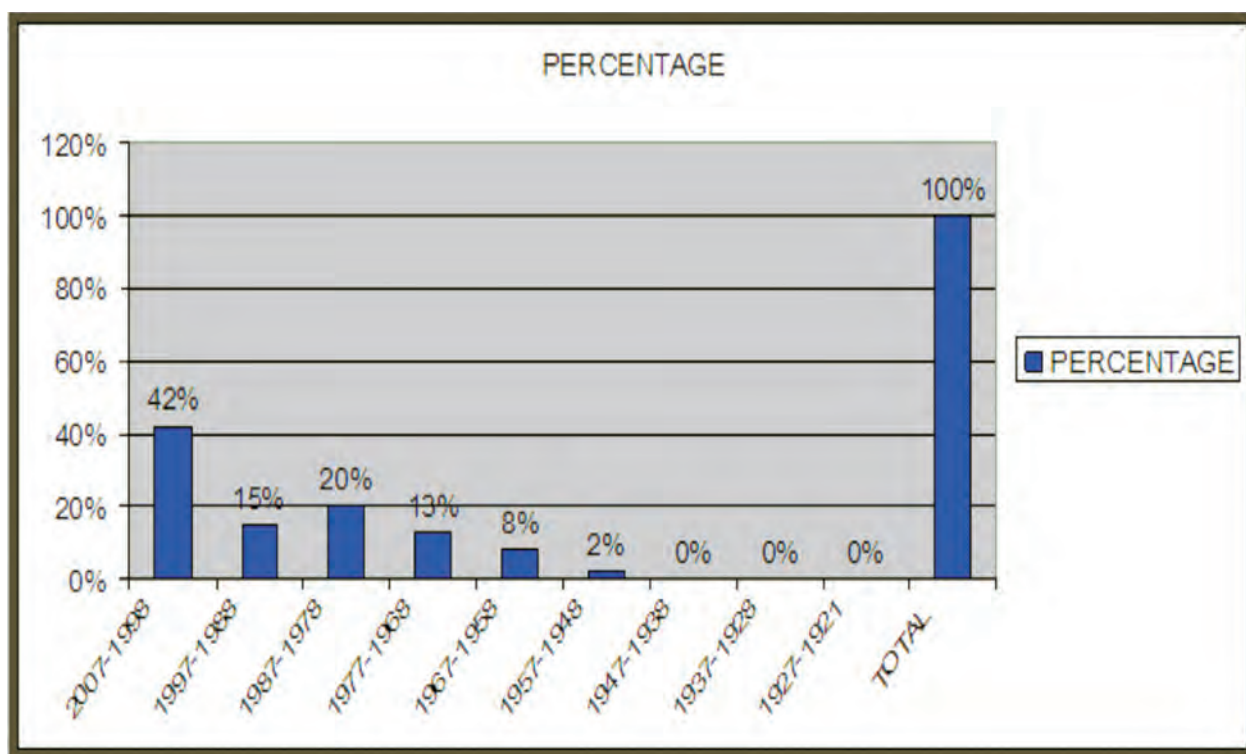


Fig.1 Growth of Research Productivity

From 2007 to 1921 a total 224 thesis has been submitted. Maximum number of thesis submitted in 2007 -1998 decade that is 93 and there is no thesis has been submitted in 1927-1921 and in 1997 -1988 is 34 thesis and 1987 -1978 is 44 thesis, 1977 -1968 is 29 thesis 1967 -1958 is 18 thesis 1957 -1948 is 4 thesis 1947 -1938 is 1 thesis ,1937 -1928 is 1 thesis has been submitted.

Table: 2 Year wise distribution of thesis submitted from - 2007- 1998

Table: 2 Year wise distribution of thesis submitted from - 2007- 1998

Years	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	TOTAL
Frequency	0	8	23	14	11	13	5	7	7	5	93
%	0	9	24	15	12	14	5	8	8	5	100

In this decade maximum number of thesis submitted in 2005 i.e. 23. There is no thesis submitted in 2007.

Table-3 Year wise distribution of Thesis submitted from -1997- 1988

Years	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	TOTAL
Frequency	6	2	2	1	4	3	5	5	2	4	34
%	17	6	6	3	12	9	14	15	6	12	100

In this decade maximum number of thesis submitted in 1997 that is 6 and in 1994 only one thesis has been submitted.

Table-4 Year wise distribution of Thesis submitted from 1987-1978

Years	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	TOTAL
Frequency	3	2	1	5	8	2	4	9	6	4	44
%	7	5	2	11	18	5	9	20	14	9	100

In this decade maximum number of thesis submitted in 1980 that is 9 and in 1985 only one thesis has been submitted.

Table-5 Year wise distribution of Thesis submitted from 1977-1968

Years	1977	1976	1975	1974	1973	1972	1971	1970	1969	1968	TOTAL
Frequency	5	1	2	4	4	0	2	4	4	3	29
%	18	4	7	14	14	0	4	14	14	11	100

In this decade maximum number of thesis submitted in 1977 that is 5 and there is no thesis has been submitted in 1972.

Table-6 Year wise distribution of Thesis submitted from 1967-1958

Years	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	TOTAL
Frequency	3	3	4	3	2	2	1	0	0	0	18
%	17	17	21	17	11	11	6	0	0	0	100

In this decade maximum number of thesis submitted in 1965 that is 4. There is no thesis has been submitted in 1960, 1959, and 1958.

Table-7 Year wise distribution of Thesis submitted from 1957-1948

Years	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948	TOTAL
Frequency	0	2	0	0	1	0	0	1	0	0	4
%	0	50	0	0	25	0	0	25	0	0	100

In 1956 two thesis, 1953 and 1952 one thesis has been submitted and rest of The year there is no thesis has been found

Table-8 Year wise distribution of Thesis submitted from 1947-1938

Years	1947	1946	1945	1944	1943	1942	1941	1940	1939	1938	TOTAL
Frequency	0	1	0	0	0	0	0	0	0	0	1
%	0	100	0	0	0	0	0	0	0	0	100

In this decade only one thesis has been submitted in 1946.

Table-9 Year wise distribution of Thesis submitted from 1937-1928

Years	1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	TOTAL
Frequency	0	0	0	0	1	0	0	0	0	0	1
%	0	0	0	0	100	0	0	0	0	0	100

In this decade only one thesis has been submitted in 1933.

Table-10 Year wise distribution of Thesis submitted from 1927-1921

Years	1927	1926	1925	1924	1923	1922	1921	TOTAL
Frequency	0	0	0	0	0	0	0	0
%	0	0	0	0	0	0	0	0

During this period there is no thesis has been submitted.

Table-11: Distribution of Theses (Subjects Analysis over different time Period)

Subjects	Number Of Thesis
Anatomy	26
Cell Biology	12
Ecology	29
Embryology	20
Genetics	34
Molecular Botany	22
Morphology	20
Paleobotany	26
Physiology	25
Taxonomy	10

Maximum number of thesis on genetics has been found 34 and as comparison to other subjects, there is less researches in taxonomy 10 and other branch in Anatomy 26, Cell Biology is 12, Ecology is 29, Embryology is 20, Molecular Biology is 22, Morphology is 20, and Paleobotany is 26, physiology is 25.

**Fig.2 (subject analysis) subject wise theses****Table: 12. Analysis by Botany Subject "Branch"****Table-12.1 Thesis Submitted in Anatomy from 2007-1921**

Decade	2007-1989	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	7	7	7	2	2	1	0	0	0	26
%	27	27	27	8	8	4	0	0	0	100

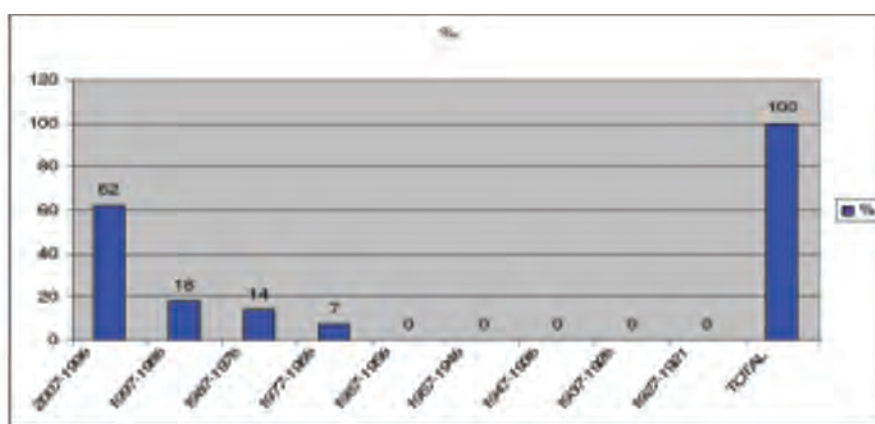


Fig. 5 shows theses submitted in Ecology

Maximum thesis submitted Ecology in 2007-1998 is 18 and in decade 1997 to 1998 is 5, and 1987-1978 is 4, 1977-1968 is 2 theses. There is no thesis has been submitted in 1967 to 1921.

Table-12.4 Thesis Submitted in Embryology from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	8	3	6	2	1	0	0	0	0	20
%	40	15	30	10	5	0	0	0	0	100

In all decade total no of thesis submitted in Embryology is 20 from 2007 to 1921

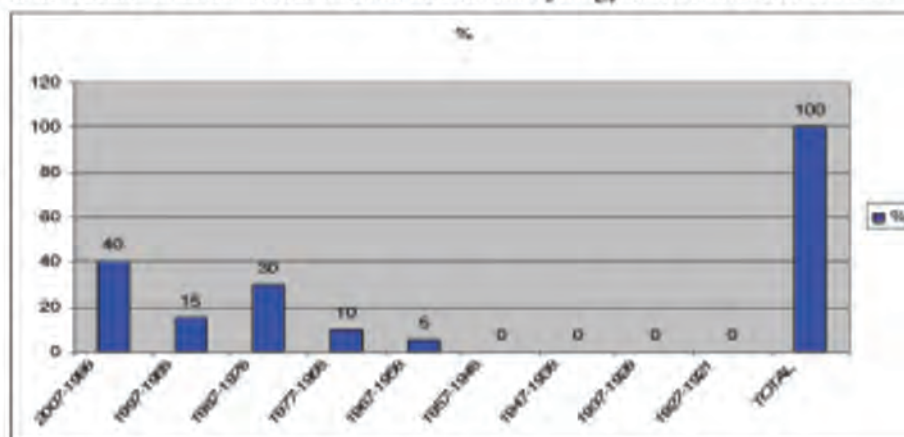


Fig. 6 shows theses submitted in Embryology

In this subject maximum number of thesis submitted in Embryology in 2007-1998 is 8 and 1977-1988 is 3, 1987 -1978 is 6 and 1977-1968 is 2, 1967-1958 is 1 thesis submitted .There is no research in 1957-1921.

Table-12.5 Thesis Submitted in Genetics from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	22	11	0	5	3	0	0	0	0	34
%	65	12	0	15	9	0	0	0	0	100

In all decade total no of thesis submitted in Genetics is 34 from 2007 to 1921

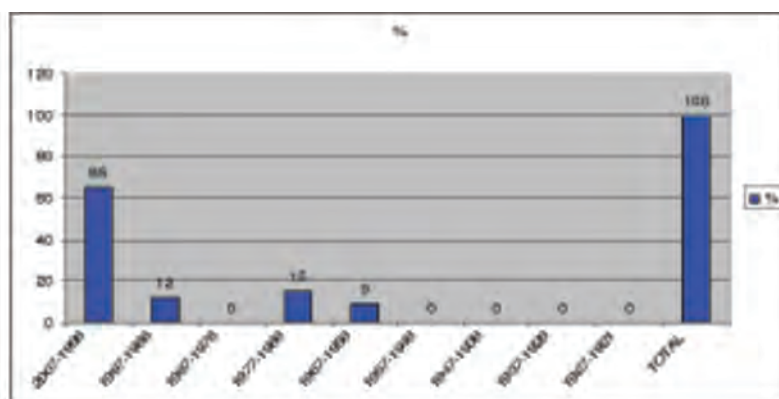


Fig. 7 shows theses submitted in Genetics

In this subject maximum number of theses submitted in Genetics in 2007-1998 is 11 and 1997-1988 are 2, 1987-1978 is 0, 1977-1968 is 5, 1967-1958 is 3 theses submitted. Maximum number of thesis submitted in Genetics in all decade.

Table-12.6 Thesis Submitted in Molecular Biology from 2007-1921.

DECADE	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	7	4	2	5	4	0	0	0	0	22
%	32	18	9	23	18	0	0	0	0	100

In all decade total no of thesis submitted in Molecular Biology is 22 From Year 2007-1921

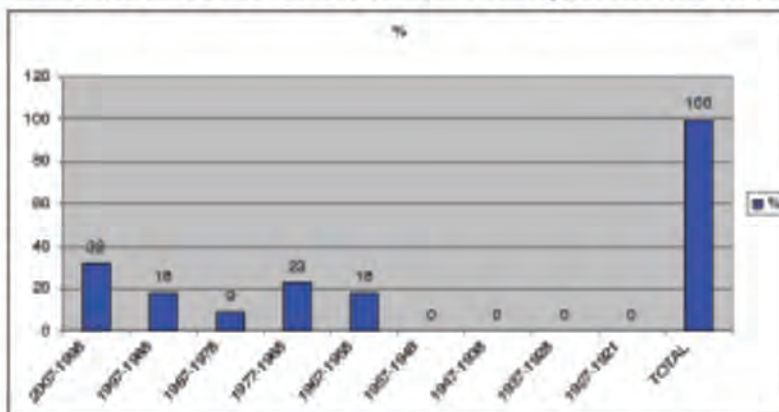


Fig. 8 shows theses submitted in Molecular Biology

In Molecular Botany maximum no of thesis submitted in 2007-1998 that is 7 and in 1997-1988 is 4, 1987-1978 is 2, 1977-1968 is 5, 1967-1958 is 4 thesis submitted. there is no thesis submitted in 1957-1921.

Table-12.7 Thesis Submitted in Morphology from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	9	4	5	0	1	0	0	1	0	20
%	45	20	25	0	5	0	0	5	0	100

In all decade total no of thesis submitted in Morphology is 20 From Year 2007-1921.

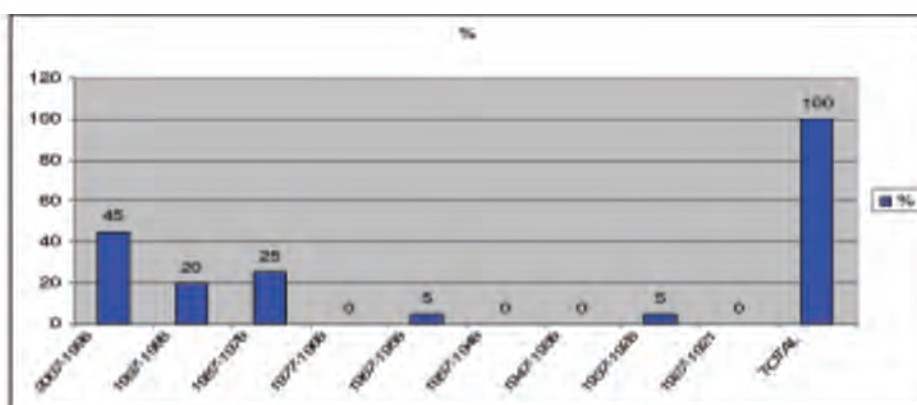


Fig. 9 shows theses submitted in Morphology

In Morphology maximum number of research in the decade 2007-1998 is 4 and in 1997-1988 is 2, 1987-1978 is 3, 1977-1921 only 2 theses have been submitted.

Table-12.8 Thesis Submitted in Paleobotany from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	7	1	9	4	3	2	0	0	0	26
%	27	4	35	15	11	8	0	0	0	100

In all decade total thesis Submitted in Paleobotany is 26 From Year 2007-1921

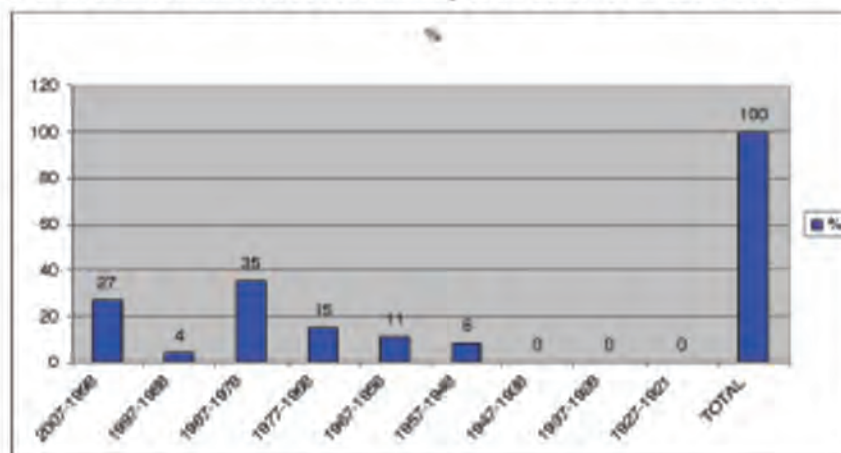


Fig. 10 shows theses submitted in Paleobotany

In Paleobotany maximum number of thesis submitted in 200-1998 that is 7 and in 1997-1988 is 1, 1987-1978 is 9, 1977-1968 is 4, 1967-1958 is 3, 1957-1948 is 2 thesis submitted. there is no thesis submitted in 1947-1921.

Table-12.9 Thesis Submitted in Physiology from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	11	6	5	2	1	0	0	0	0	25
%	44	24	20	8	4	0	0	0	0	100

In all decade total no of thesis submitted in Physiology is 25 from year 2007-1921

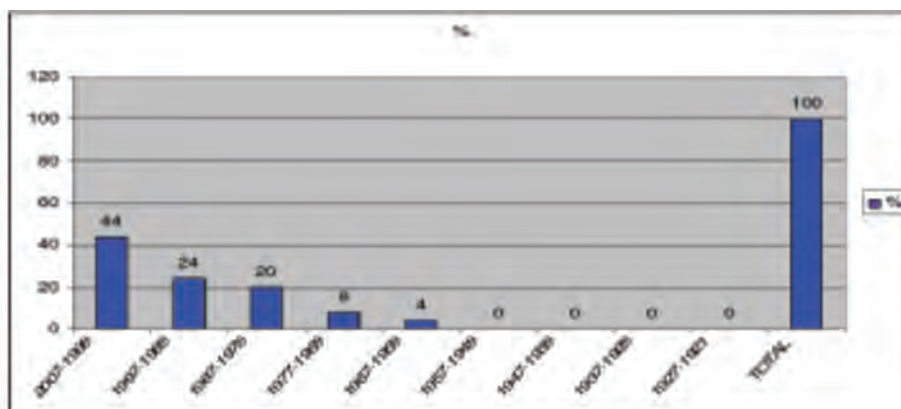


Fig. 11 shows theses submitted in Physiology

Maximum number of thesis submitted in Physiology in 2007-1998 that is 11 and in 1997-1988 is 6, 1987-1978 is 5, 1977-1968 is 2, 1967-1958 is 1 thesis submitted. there is no thesis submitted in 1957-1921.

Table-12.10 Thesis Submitted in Taxonomy from 2007-1921.

Decade	2007-1998	1997-1988	1987-1978	1977-1968	1967-1958	1957-1948	1947-1938	1937-1928	1927-1921	TOTAL
Frequency	2	0	2	4	1	0	1	0	0	10
%	20	0	20	40	10	0	10	0	0	100

In all decade total no of thesis submitted in Taxonomy is 10 From Year 2007-1921

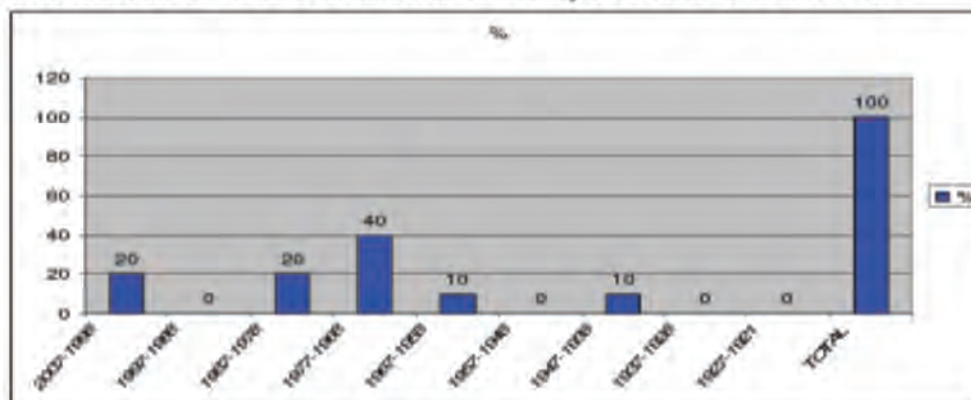


Fig. 12 shows theses submitted in Taxonomy

In Taxonomy maximum no of thesis submitted in 1977-1968 that is 4 and in 2007-1998 and, 1987-1978 is 2, 1967-1958 is 1, 1947-1938 is 1 thesis submitted. there is no thesis submitted in 1957-1948 and 1937-1921.

Findings: The major findings of the study are as under:

- Maximum number of thesis 93 (42%) submitted in 2007-1998.
- A maximum of 23 theses have been submitted in the year 2005.
- Only one thesis has been submitted from 1947-1938.
- A maximum research 34 thesis have been submitted in Genetics branch of Botany in 2007-1998.
- Maximum number of thesis on Genetics has been found and as rather than other subjects, there is less researches in Taxonomy.
- There is no thesis has been submit that is year -2007,

1972,1960,1959,1958,1957,1956,1954,1952,1951,1949,1948,1947,1945,1944,1943,1942,1941,1940,1939,1938,1933,1942,1940,1941,1939,1938,1937,1936,1935,1934,1933,1932,1931,1930,1928,1927,1926,1925,1924,1923,1922,1921.

Conclusion: With all results concluded that the academic output of this Department has brought laurels, reputation and excellence. The rich traditions and strongly knitted academic fabric as laid down by late Professor Sahni in 1921 was nurtured further by his successors Professor: Prof. S.N. Das Gupta (1949-61), Prof. C. Chatterjee (2002-2003) and many others. Researcher spared speedily and do maximum research in Genetics branch of Botany, so present day Genetic branch is most predominant field and spread rapidly new techniques as like human clone, text tube baby, D.N.A finger printing etc. Present time research is to explore new dimension and discipline but it has seen that majority of thesis have been found concentrations of research are in the branches of modern Botany and only a few researchers have chosen to work in the classical field.

Suggestions: The following suggestions are put forth for future augmentation:

- A comprehensive bibliography should be compiled on the subject including each and every thesis and bibliography should be provided for researcher users through Library or online services;
- The work should be done at national and state level and the bibliography complied;
- Proper attention should be at the time of approval of topic so duplication may be avoided.
- Institutional repository should be developing at University level.

References:

1. What is Botany (2012) Retrieved on March,02,2014 from <http://www.botany.org/bsa/careers/car-what.html>
2. Branch of Botany. (2012). Retrieved on March, 02, 2014 from <http://www.publishyourarticles.net/knowledge-hub/science/what-are-the-26-branches-of-botany.html>.
3. Introduction about Botany department, Lucknow University. (2014). Retrieved on March,02,2014 from http://www.lkouniv.ac.in/science_bot.html
4. Nandi. A. & Bandyopadhyay., A.K. (2013). Scientometric Dimensions of Research Productivity of the Botany Department, During 1960-2000. *Library Philosophy and Practice*, 931, 1-8 Retrieved on April, 18, 2013 from <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2275&context=libphilprac>
5. Suma. S. & Pillai., S. K.G. (2013) Studied Doctoral Dissertation of CSIR, NIIST in Thiruvananthapuram: A Study, 60 (3), 71-77. *Annals of library and information science* Retrieved on April, 18, 2013 from <http://nopr.niscair.res.in/bitstream/123456789/20165/1/ALIS%2060%282%29%2071-77.pdf>.
6. Olatokam., W.M, (2009). Citation Analysis of Doctoral works submitted to the Department of Animal science, University of Ibadan, Nigeraia, *Library Philosophy and Practice* 5, 45-52. Retrieved on April, 22, 2013 from <http://www.webpages.uidaho.edu/~mbolin/olatokun-makinde.html>.
7. Kumar. S & Shah., G (2007) Research productivity of journal Indian journal of entomology during 1989-2003. *Library Philosophy and Practice*, 931, 1-8 Retrieved on February, 25, 2013 from [https://www.google.co.in/?gws_rd=ssl#q=S.+Kumar%2C+and+Shah%2C+G+\(2007+research+paper\)](https://www.google.co.in/?gws_rd=ssl#q=S.+Kumar%2C+and+Shah%2C+G+(2007+research+paper))
8. Vimala. V & Reddy., P.V. (1996). Authorship Pattern and Collaborative Research in the field of Zoology, Malaysian. *Journal of Library & Information Science*, 1, (2), 43-50

9. Maheswarappa & Nagappa., L (1993). Bibliography of Doctoral Theses in Botany in India, *DESIDOC bulletin of Information Technology*, 18(1), 25-44, retrieved on July, 18, 2013 from file:www.desidoc.org/Downloads/3384-10213-1-SM.pdf.
10. Maheswarappa. B. S. & Prakash., B. P. (1982). Literature Use Pattern by the Researchers in the Field of Botany: A Citation Study of Doctoral Theses. *Journal of Library and Information Science*, 7(1): 15-32 Retrieved on July, 18, 2013 from www.gulbargauniversity.kar.nic.in/FacSocSci/.../LibInfSciBSMaheshrp.h.
11. Websites: www.vidhyanidhi.org.