



## CITATION ANALYSIS OF DOCTORAL THESES OF ZOOLOGY SUBJECT SUBMITTED TO THREE UNIVERSITIES IN KARNATAKA, INDIA.

Y. L. Somashekara<sup>1</sup> and Mallinath Kumbar<sup>2</sup>

<sup>1</sup> Research Scholar, Department of Library & Information Science, University of Mysore, Manasagangothri, Mysore.

<sup>2</sup> Professor, Department of Studies in Library and Information Science, University of Mysore, Manasagangothri, Mysore.

**Abstract:**-The present paper analysis of the Zoology doctoral theses submitted to three universities in Karnataka. This study covers 6909 citations. The study indentify that journal article resource is (78%) followed Books (11%). Bangalore university zoology researcher cited 2026 highest journal articles. Evolution (147) Genetics (129) is the highest referred journals. Subject wise distribution of citations and journal citations, Ranking of Journal source, journal publication geographical distribution are determined.

**Keywords:**Zoology Theses, Citation analysis, Subjects, Journal ranking.

### 1. INTRODUCTION

Citation analysis is one of the techniques of bibliometric. Citation analysis is used for the study of the properties and behaviors of recorded knowledge. It is an important research tool for understanding the subject, which we analyze the structure and direction of the subject Citation analysis involves the where the unit of analysis is a document is being cited as a bibliographic references or a foot note in a citing document. The main function of citations is to establish a relationship between the citing and cited documents. Citation analysis is an accepted method for studying the way scholarly

### 2. LITERATURE REVIEW

Kannappanavar B U (2013) studied citations of 24 doctoral dissertations in Applied Zoology submitted to Kuvempu University since its inception was analyzed to study the information use pattern of research scholars. The application of Bradford's Law of scattering to the literature of botany reveals an exponential trend when plotted on the graph. The study shows that the distribution pattern of citations by type of documentary sources shows that periodicals are highly cited (75.52%). Books are considered as the second major source, which accounts for 17.25%. In other words, periodicals and books together constitute 92.77% while other forms of sources are negligible. Team research prevails in the field of Biotechnology. The study shows that United States occupied top position with 1,679 citations (32.69%) followed by India 1,303 (25.37%) and United Kingdom 842 (16.39%). It is evident from the result of the study that the Journal Mutation Research 212 (5.46%) occupies first in the rank list of journals, followed by the Journal of Bombay Natural History Society 74 (1.90%) and Aquaculture 70 (1.80%), Journal Fish Biology 67 (1.72%) scores the highest number of citations among the most cited periodicals

Amitava Nandi and Amit Kumar Bandyopadhyay (2010) studied the top ranking journals publishing the papers are from India with 440 (61.18%) publications followed by Germany with 55(7.64%) publications, Netherlands with 45(6.25%) publications, USA with 40(5.56%) publications, China with 25(3.47%) publications and UK with 24(3.38%) publications.

### 3. OBJECTIVE OF THE STUDY

The researcher has established the following objectives

Y. L. Somashekara<sup>1</sup> and Mallinath Kumbar<sup>2</sup>, "CITATION ANALYSIS OF DOCTORAL THESES OF ZOOLOGY SUBJECT SUBMITTED TO THREE UNIVERSITIES IN KARNATAKA, INDIA." e-Library Science Research Journal | Volume 3 | Issue 4 | Feb 2015 , Online & Print

- a) To analyze the total citation of theses
- b) To determine the forms of literature used in Zoology theses
- c) To analyze the university wise forms of literature used in Zoology theses.
- d) To establish the subject wise distribution of citations.
- e) To study subject wise distribution of Journal citations
- f) To organize the journal ranking
- g) To establish the country wise distribution journal citations in Zoology theses
- h) To analyze the Bradford's law of scattering.

#### 4. METHODOLOGY AND SAMPLES

The literature cited in Ph.D. theses in the field of Zoology was the base information for the study. In this context of main objective of this study examined the citation pattern of researchers in zoology using the references append of Ph. D. Theses submitted to the prestigious universities in Karnataka that are University of Mysore, Karnatak University, and Bangalore University during the year 2006-2010. Around 6909 citations of 52 theses and an average of 132 citations per thesis are studied. The data was tabulated in terms of subject wise distribution of journals, books and other resources and ranked list of journals are analyzed

#### 5. ANALYSIS AND DISCUSSION

Analysis of data is the ultimate step of research process. It is inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information and suggesting conclusions. It is the link between raw data and conclusions

##### 5.1 Year wise Distribution of Zoology Theses

The attempt was made to analyze the zoology theses in predefined years. The table 1 shows the year wise available these and analyzed theses.

**Table 1- Year wise analyzed theses of Zoology**

Year	Analysis Theses	Cumulative Theses	Percentage	Cumulative percentage
2006	07	07	13.47	13.47
2007	05	12	09.61	23.08
2008	10	22	19.23	42.31
2009	16	38	30.77	73.08
2010	14	52	26.92	100.00
Total	52		100.00	

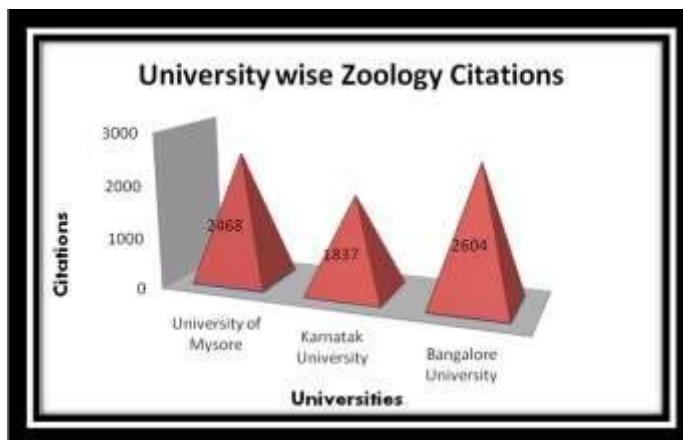
The Table -1 reveals that the highest theses in 2009 (30.77%), followed 2010 (26.92%) and 2008 (19.23%) respectively.

##### 5.2 University wise Zoology theses Citations

**Table 2- University wise zoology theses citations**

Serial no	Universities	Theses	Zoology	C.F	Percentage	C.F
1	University of Mysore	22	2468	2468	35.723	35.723
2	Karnatak University	11	1837	4305	26.588	62.311
3	Bangalore University	19	2604	6909	37.689	100.000
	Total	52	6909		100.000	

Figure -1 University wise zoology these citation distribution



The Table-2 and figure -1 state that Bangalore University 2604(37.689%) followed University of Mysore 2468 (35.723%) and Karnatak University 1837 (26.588%), It is shows the Bangalore university zoology researcher cited references are very high compare to Karnatak university researcher.

### 5.3 Bibliographical forms of distribution

The researcher most important resources are books and journals but present days the resources type are distributed different forms that are journals, books, theses reports, manuals, technical reports, e- resources, reference materials, workshops, Notes, reviews, abstracts, and other resource but the prestigious university zoology researcher are used mainly the journals, books, thesis, reports and other fifteen type of documents . The details are explained in table -3.

Table -3 Bibliographical forms of distribution

S. No.	Forms of Document	Citations	C.F	Percentage	C.F
1	Journals	5397	5397	78.115	78.115
2	Books	751	6148	10.869	88.984
3	Thesis	96	6244	1.389	90.373
4	Reports	78	6322	1.128	91.501
5	E-resources	52	6374	0.754	92.255
6	Reference Materials	82	6456	1.188	93.443
7	Conference proceedings	350	6806	5.067	98.510
8	Others	103	6909	1.490	100.000
	Total	6909		100.000	

Figure -2 Bibliographical forms of distribution

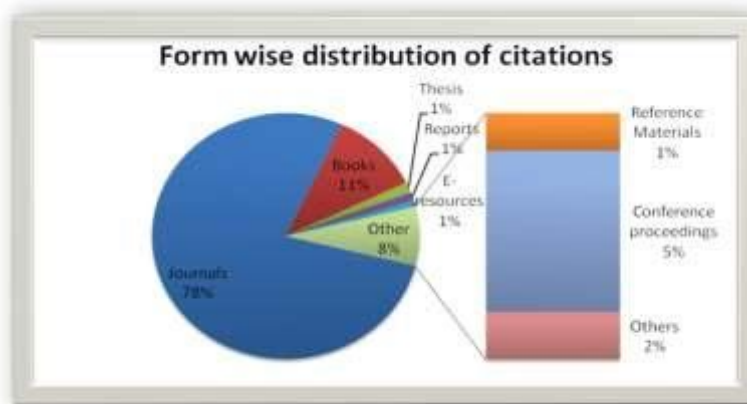


Table -3 and figure -2 state that bibliographic forms of zoology researcher used resources. The zoology researcher are main resource is journal article source (78%) followed Books (11%) Conference Proceedings (5%)

and others resources. It is indicate that zoology researchers very much depend the journal article resources for their, research work.

#### 5.4 University wise and bibliographic form of distributions

Zoology researcher of three universities cited in their theses different forms of resources that are explained in table- 4.

**Table 4 University wise bibliographical forms of distribution**

Univers ity	Journ als	Book s	Con. Pro. Sem i.	Th eses	Rep orts	Re f.	E- resource	Oth er	T ot al	Perce.
UOM	2018	2 53	84	28	16	18	15	36	2468	35.72
KU	1353	2 40	118	26	31	27	16	26	1837	26.59
BU	2026	2 58	148	42	31	37	21	41	2604	37.69
T total	5397 (78.11%)	7 51 (10.86%)	350 (5.06%)	96 (1.3 8%)	78 (1.12%)	82 (1.18%)	52 (0.75%)	103 (1.49%)	6909	100

Table -4 reveals that bibliographical forms of University of Mysore (UOM), Karnatak University (KU) and Bangalore University (BU). The three Universities Zoology researcher mainly depend Journal articles (78.11%) followed Books (10.86%), Conference Proceedings (5.06%), Theses (1.38%), Reference document (1.18%). The e-resource (0.75%) and other document (1.49%). The Bangalore university zoology researcher cited Journals 2026 is the highest followed University of Mysore (2018) and Karnatak University (1353).

The table 4 reveals that the percentage of reference cited in zoology theses Bangalore University is highest (37.69%) followed Mysore University (35.72%) and Karnatak University (26.59%).

#### 5.5 Subject wise distribution of citations

The researcher of three universities of Karnataka cited different subject resource. Researcher divided according to Dewey decimal classification scheme main class numbers. Table 5 is state the details.

**Table -5 DDC classification wise source distributions**

Serial. No	DDC Class No.	Subjects	Citations	CF	Percentage	CF %
1	300-399	Social Science	78	78	1.128	1.128
2	500 -599	Science	5090	5168	73.672	74.800
3	600-699	Applies Science & Medical Science	1741	6909	25.199	100.00
		Total	6909		100.00	

The table -5 reveals that zoology researcher cited science documents (73.67%) followed Applied Science and Medical science (25.199), Social science (1.128%). It indicates zoology researcher highly referred source are Science, Applied science & Medical Science (99%) subjects.

##### 5.5.1 Subject wise distribution of citations

The zoology researcher cited source are scattered in all most all subject but zoology is main resource. The details explained in Table-6

**Table -6 Subject wise distributions of citations**

Sl. No	Subject	Citations	Cumulative	Percentage	CF of %
1	Psychology	26	26	0.376	0.376
2	Environmental Economics	46	72	0.666	1.042
3	Education	6	78	0.087	1.129
4	Science	462	540	6.687	7.816
5	Physics	4	544	0.058	7.874
6	Chemistry	54	598	0.782	8.656
7	Geology	109	707	1.578	10.234
8	Biology	681	1388	9.857	20.091
9	Biochemistry	146	1534	2.113	22.204
10	Genetics	537	2071	7.772	29.976
11	Microbiology	11	2082	0.159	30.135
12	Botany	53	2135	0.767	30.902
13	Zoology	2639	4774	38.197	69.099
14	Ecology	386	5160	5.587	74.686
15	Anthropology	8	5168	0.116	74.802
16	Medical Science	1364	6532	19.742	94.544
17	Ayurvedha	4	6536	0.058	94.602
18	Agricultural Science	216	6752	3.126	97.728
19	Sericulture	47	6799	0.680	98.408
20	Food Science	79	6878	1.143	99.551
21	Biotechnology	27	6905	0.391	99.942
22	Sports	4	6909	0.058	100.000
	Total	6909		100.000	

Table -6 reveals that Zoology (38.197%) followed Medical science (19.742%), Biology (9.857%) references are cited in zoology theses. The zoology research work distributed in allied science subjects and interdisciplinary research work is dominated in zoology subject.

### 5.6 Subject wise journal article citation distribution

The zoology researchers are cited different subject citations. They cited zoology subject citations. This data analyzed according to journal subject based Ulrich periodical directory and Dewy Decimal classification subjects.

**Table- 7 Subject wise journal article citation distribution**

Sl. No	Subject	Citations	Cumulative	Percentage	Cumulative percentage
1	Psychology	20	20	0.371	0.371
2	Environmental Economics	34	54	0.630	1.001
3	Education	4	58	0.074	1.075
4	Science	389	447	7.208	8.283
5	Physics	4	451	0.074	8.357
6	Chemistry	41	492	0.760	9.117
7	Geology	86	578	1.593	10.710
8	Biology	542	1120	10.043	20.753
9	Biochemistry	106	1226	1.964	22.717
10	Genetics	351	1577	6.504	29.221
11	Microbiology	9	1586	0.167	29.388
12	Botany	47	1633	0.871	30.259
13	Zoology	2149	3782	39.818	70.077
14	Ecology	231	4013	4.280	74.357
15	Anthropology	7	4020	0.130	74.487
16	Medical Science	1130	5150	20.938	95.425
17	Ayurvedha	2	5152	0.037	95.462
18	Agricultural Science	118	5270	2.186	97.648
19	Sericulture	36	5306	0.667	98.315
20	Food Science	61	5367	1.130	99.445
21	Biotechnology	26	5393	0.482	99.927
22	Sports	4	5397	0.073	100.000
	Total	5397		100.000	

Table – 7 state that the zoology researcher referred Zoology (39.118%) subject journals followed Medical Science (20.938%), Biology (10.043%), science (7.208%), genetics (6.504%), Ecology (4.280%) subject journals but the researcher much more referred Zoology and Medical science subject journals.

### 5.7 Ranking of Journals

The researcher cited highest is journal article source. According to the cited journals title ranking list below table it is essential a practical tool for librarians and researcher. Such ranked list of journals can be used libraries and research workers to select the journals of greater importance.

**Table -8 Ranking of cited journals**

Sl. No	Journal Title	Ranking	Citations	Cumulative Citations	Percentage	Cumulative percentage	Place of publication
1	Evolution	1	147	147	2.72	2.72	USA
2	Genetics	2	129	276	2.39	5.11	USA
3	Drosophila. Information service	3	112	388	2.08	7.19	USA
4	Indian journal of Experimental Biology	4	104	492	1.93	9.12	India
5	Animal behavior	5	94	586	1.74	10.86	UK
6	Indian Bee journal	6	91	677	1.69	12.55	India
7	Hydrobiologia	7	82	759	1.52	14.07	Netherland
8	Journal of Palynology	8	76	835	1.41	15.48	India
9	Development	8	76	911	1.41	16.89	UK
10	Heredity	9	74	985	1.37	18.26	UK
11	Current Science	10	72	1057	1.33	19.59	India
12	Proceedings of the National Academy of Science	11	67	1124	1.24	20.83	USA
13	Zoological Studies	12	61	1185	1.13	21.96	Taiwan
14	Limnologia	13	60	1245	1.11	23.07	Germany
15	Journal of Environmental Biology	14	59	1304	1.09	24.16	India
16	Biology of reproduction	14	59	1363	1.09	25.25	USA
17	Cytologia	15	54	1417	1.00	26.25	Japan
18	Genome	16	53	1470	0.98	27.23	Canada
19	Annual Review of Entomology	17	52	1522	0.96	28.18	USA
20	Nature	17	52	1574	0.96	29.15	UK
21	Bee world	18	51	1625	0.94	30.09	UK
22	General & Comparative endocrinology	18	51	1676	0.94	31.03	USA
23	Journal of Advanced Zoology	19	49	1725	0.91	31.94	India
24	Pollution Research	20	48	1773	0.89	32.83	India
25	Environment Ecology	21	47	1820	0.87	33.70	USA
26	American midland Naturalist	22	46	1866	0.85	34.55	USA
27	Science	23	45	1911	0.83	35.38	USA
28	Chromosoma	23	45	1956	0.83	36.21	Germany
29	Journal of Biological Control	24	44	2000	0.82	37.03	USA
30	Proceedings of Indian Academy of Science	25	43	2043	0.80	37.83	India

Citation analysis of doctoral theses of Zoology subject submitted to three universities in Karnataka, India.

31	Journal of Fish Biology	25	43	2086	0.80	38.63	UK
32	Cell	25	43	2129	0.80	39.43	USA
33	International Journal of Environmental Science Technology	26	42	2171	0.78	40.21	Germany
34	Grana	26	42	2213	0.78	40.99	Sweden
35	Apiculture	26	42	2255	0.78	41.77	Germany
36	Journal of Insect Physiology	27	41	2296	0.76	42.53	UK
37	Zoological Science	27	41	2337	0.76	43.29	USA
38	Conservation Biology	27	41	2378	0.76	44.05	USA
39	Indian Journal of Fisheries	28	40	2418	0.74	44.79	India
40	Journal of Ecotoxicology Environ Monitor	28	40	2458	0.74	45.53	India
41	Biologia	29	39	2497	0.72	46.25	UK
42	Biochemistry	29	39	2536	0.72	46.97	USA
43	Ecoscience	30	38	2574	0.70	47.67	Canada
44	Bulletin of Environmental Contamination Toxicology	30	38	2612	0.70	48.37	USA
45	Developmental Biology	31	37	2649	0.69	49.06	USA
46	Mutation research	31	37	2686	0.69	49.75	Netherland
47	Journal of Insect Physiology	31	37	2723	0.69	50.44	UK
48	Apidologia	32	36	2759	0.67	51.11	France
49	Plant cell tissue & Organ Culture	32	36	2795	0.67	51.78	Netherland
50	Journal of Ecology	33	35	2830	0.65	52.43	UK
51	Endocrinology	34	34	2864	0.63	53.06	USA
52	Journal of Eco-toxicology & Environmental Monitor	34	34	2898	0.63	53.69	India
53	Journal of Genetics	35	33	2931	0.61	54.30	India
54	Journal of Herpetology	36	32	2963	0.59	54.89	USA
55	Entomon	36	32	2995	0.59	55.48	India
56	Comparative Biochemistry Physiology Part A Molecular Integrated Physiology	37	31	3026	0.57	56.05	USA
57	Endocrine Review	37	31	3057	0.57	56.62	USA
58	Journal of Morphology	38	30	3087	0.56	57.18	USA
59	Journal of Insect Science	38	30	3117	0.56	57.74	USA
60	Water Research	39	29	3146	0.54	58.28	UK
61	Journal of Experimental Zoology	39	29	3175	0.54	58.82	UK
62	Indian Journal of Agricultural Science	39	29	3204	0.54	59.36	India
63	Sericologia	40	28	3232	0.52	59.88	India
64	Karnataka Journal of Agricultural Science	40	28	3260	0.52	60.40	India
65	Hormone & Behavior	41	27	3287	0.50	60.90	USA
66	Behavior	41	27	3314	0.50	61.40	USA
67	International Review of Hydrobiologia	41	27	3341	0.50	61.90	USA
68	PLOS one	42	26	3367	0.48	62.38	USA
69	Brain Research	42	26	3393	0.48	62.86	Netherland
70	Journal of Environmental Biology	42	26	3419	0.48	63.34	India
71	Herpetological Journal	42	26	3445	0.48	63.82	UK
72	Journal of science	43	24	3469	0.44	64.26	USA
73	Water resource	43	24	3493	0.44	64.70	Russia
74	Lancet	43	24	3517	0.44	65.14	UK
75	Journal of Biological chemistry	44	23	3540	0.43	65.57	USA
76	Contraception	44	23	3563	0.43	66.00	USA

Citation analysis of doctoral theses of Zoology subject submitted to three universities in Karnataka, India.

77	Indian journal of Biochemistry & Biophysics	45	22	3585	0.41	66.41	India
78	Experimental Gerontology	45	22	3607	0.41	66.82	USA
79	Bulletin of Environmental toxicology	45	22	3629	0.41	67.23	USA
80	Current Biology	46	21	3650	0.39	67.62	USA
81	Journal of Bacteriology	46	21	3617	0.39	68.01	USA
82	Hydrobiologia	47	20	3691	0.37	68.38	Netherland
83	Biology & Fertility of soils	47	20	3711	0.37	68.75	Germany
84	Journal of Ethno-pharmacology	48	19	3730	0.35	69.10	Elsevier
85	Canadian Journal of Zoology	48	19	3749	0.35	69.45	Canada
86	Journal of American Mosquito Control Association	49	18	3767	0.33	69.78	USA
87	Quarterly Review of Biology	49	18	3785	0.33	70.11	USA
88	Hormones and Behavior	49	18	3803	0.33	70.44	USA
89	Geophytology	50	17	3820	0.31	70.75	India
90	Medical and Veterinary Entomology	50	17	3837	0.31	71.06	UK
91	Journal of Agricultural & Food Chemistry	51	16	3853	0.30	71.36	USA
92	Current Opinion in Genetics and Development	51	16	3869	0.30	71.66	UK
93	Journal of Clinical Investigation	51	16	3885	0.30	71.96	USA
94	Oecologia	51	16	3901	0.30	72.26	Germany
95	Nucleic Acids Research	51	16	3917	0.30	72.56	UK
96	The American naturalist	51	16	3933	0.30	72.86	USA
97	American Bee Journal	52	15	3948	0.28	73.14	USA
98	Indian Journal of Sericulture	53	14	3962	0.26	73.40	India
99	Ethnology	53	14	3976	0.26	73.66	Japan
100	Journal of Bombay Natural History Society	53	14	3990	0.26	73.92	India
101	Environment Pollution	53	14	4004	0.26	74.18	Netherland
102	Nature Genetics	54	13	4017	0.24	74.42	UK
103	Journal of Biological control	54	13	4030	0.24	74.66	USA
104	Journal of Biological Chemistry	54	13	4043	0.24	74.90	USA
105	Toxicological Science	54	13	4056	0.24	75.14	UK
106	JAMA	54	13	4069	0.24	75.38	USA
107	Planta Medica	54	13	4082	0.24	75.62	Germany
108	Indian Journal of Physiological Pharmacology	54	13	4095	0.24	75.86	India
109	Food chemistry	54	13	4108	0.24	76.10	
110	Japan Journal of genetics	55	12	4120	0.22	76.32	Japan
111	American Zoology	55	12	4132	0.22	76.54	USA
112	Journal of Insect Physiology	55	12	4144	0.22	76.76	UK
113	Behavioral Ecology	55	12	4156	0.22	76.98	UK
114	Journal of Aquatic Biology	55	12	4168	0.22	77.20	India
115	Archive of Insects Biochemistry & Physiology	55	12	4180	0.22	77.42	UK
116	Journal of Applied Entomology	55	12	4192	0.22	77.64	UK
117	Bioinformatics	55	12	4204	0.22	77.86	UK
118	Journal of Ecobiology	55	12	4216	0.22	78.08	India
119	Journal of Economic entomology	55	12	4228	0.22	78.30	USA
120	Behavior	55	12	4240	0.22	78.52	USA
121	New England Journal of Medicine	55	12	4252	0.22	78.74	UK
122	Ecology	55	12	4264	0.22	78.96	USA
123	Apiculture in Tropical Climates	55	12	4276	0.22	79.18	Srilanka



Citation analysis of doctoral theses of Zoology subject submitted to three universities in Karnataka, India.

127	Malaria Journal	56	11	4320	0.20	79.98	UK
128	Bulletin of American Museum of Natural History	56	11	4331	0.20	80.18	USA
129	Korean Journal of Genetics	56	11	4342	0.20	80.38	Korea
130	India Journal of Environmental Ecoplanning	56	11	4353	0.20	80.58	India
131	Toxicology	57	10	4363	0.19	80.77	Ireland
132	Bulletin of Environmental Contamination and Toxicology	57	10	4373	0.19	80.96	USA
133	Journal of Heredity	57	10	4383	0.19	81.15	UK
134	Journal of Theoretical biology	57	10	4393	0.19	81.34	USA
135	Diabetologia	57	10	4403	0.19	81.53	Germany
136	Journal of Fish Res. Board Canada	57	10	4413	0.19	81.72	Canada
137	Ecology Envir. Cons	57	10	4423	0.19	81.91	India
138	Journal of Vector Ecology	58	9	4432	0.17	82.08	Wiley
139	Journal of Neurobiology	58	9	4441	0.17	82.25	USA
140	Life Science	58	9	4450	0.17	82.42	Netherland
141	Human Molecular Genetics	58	9	4459	0.17	82.59	UK
142	Genetics and Molecular Research	58	9	4468	0.17	82.76	USA
143	Mechanism of Development	58	9	4477	0.17	82.93	Netherland
144	Human Mutation	58	9	4486	0.17	83.10	Netherland
145	Parasitology Research	58	9	4495	0.17	83.27	Germany
146	Southeast Asian Journal of Tropical Med Public Health	58	9	4504	0.17	83.44	Thailand
147	Brain Research	58	9	4513	0.17	83.61	Netherland
148	Proceedings of Biological Science	58	9	4522	0.17	83.78	India
149	Endocrinology Review	59	8	4530	0.15	83.93	Israel
150	Trends in Genetics	59	8	4538	0.15	84.08	UK
151	Developmental Cell	59	8	4546	0.15	84.23	USA
152	Clinical Chemistry	59	8	4554	0.15	84.38	USA
153	Biological and Pharmaceutical Bulletin	59	8	4562	0.15	84.53	Japan
154	Fitoterapia	59	8	4570	0.15	84.68	Netherland
155	Journal of Royal Society of Medicine	59	8	4578	0.15	84.83	UK
156	Australian journal of Zoology	60	7	4585	0.13	84.96	Australia
157	Journal of Mysore University	60	7	4592	0.13	85.09	India
158	Journal of Dairy Science	60	7	4599	0.13	85.22	UK
159	Diabetes Research and Clinical Practice	60	7	4606	0.13	85.35	Ireland
160	Annual New York Academy of Science	60	7	4613	0.13	85.48	USA
161	Journal of Nutrition	60	7	4620	0.13	85.61	USA
162	Marine Biology	60	7	4627	0.13	85.74	Germany
163	Annals Dyslexia	60	7	4634	0.13	85.87	USA
164	Biological Review	61	6	4640	0.11	85.98	UK
165	Proceedings of Genetics Society	61	6	4646	0.11	86.09	Canada
166	Proceedings of Royal Society A	61	6	4652	0.11	86.20	UK
167	Proceedings of Royal Society B Biological Sciences	61	6	4658	0.11	86.31	UK
168	Proceedings str. Fun. & Bioinformatics	61	6	4664	0.11	86.42	UK
169	Metabolism	61	6	4670	0.11	86.53	Netherland
170	Journal of Lipid Research	61	6	4676	0.11	86.64	USA
171	Phytomedicine	61	6	4682	0.11	86.75	Germany
172	Human Reproduction Update	61	6	4688	0.11	85.86	UK

173	Reproductive toxicology	61	6	4694	0.11	86.97	USA
174	Journal of Child Psychology and Psychiatry	61	6	4700	0.11	87.08	UK
175	23 Journals with 5 Citations	62	115	4815	2.13	89.21	
176	8 Journals with 4 citations	63	32	4847	0.59	89.80	
177	35 journals with 3 citations	64	105	4952	1.95	91.75	
178	86 journals with 2 citations	65	172	5124	3.19	94.94	
179	273 journals with single citations	66	273	5397	5.06	100.00	
	Total 599 journals		5397		100.00		

Table -8 demonstrates that ranking of journals by counting of referred and cited in zoology theses. The 5397 journal articles are cited in zoology theses and scattered 599 journal titles. However, the top fifteen journals covered twenty five percentages of citations. The United State of America (USA) published journals Evolution, (147) Genetics (129), and Drosophila Information Services (112) are top referred three journals followed Indian publication journal is Indian Journal of Experimental Biology (109) respectively.

### 5.8 Production of journals in Zoology

The productivity journal articles referred are highest and average is explained in table – 9 that are within 0 to 25 % is the average production of journals.

**Table -9 Production of Journal in Zoology**

Percentage of ns	No. Of citations	No. of journals covered	Percentage of Journals	Average production of Journals
0 to 25	1363	16	2.67	85.18
26 to 50	1360	31	5.17	43.87
51 to 75	1333	58	9.69	22.98
76 to 100	1341	494	82.47	2.71
Total	5397	599	100	9.01

It is observed from table – 9 states to that the first groups of citations are to the first 16 journals of the rank list, thus signifying their high rate of productivity. The average productivity of each journal in the first group (0 to 25 %) it was 85.18 articles, where it has considerably gone down to 2.71 articles in the fourth category (76 to 100 %). This marked easily confirms the decreasing confirms the decreasing productivity.

### 5.9 Geographical Distributions of Journal article Citation

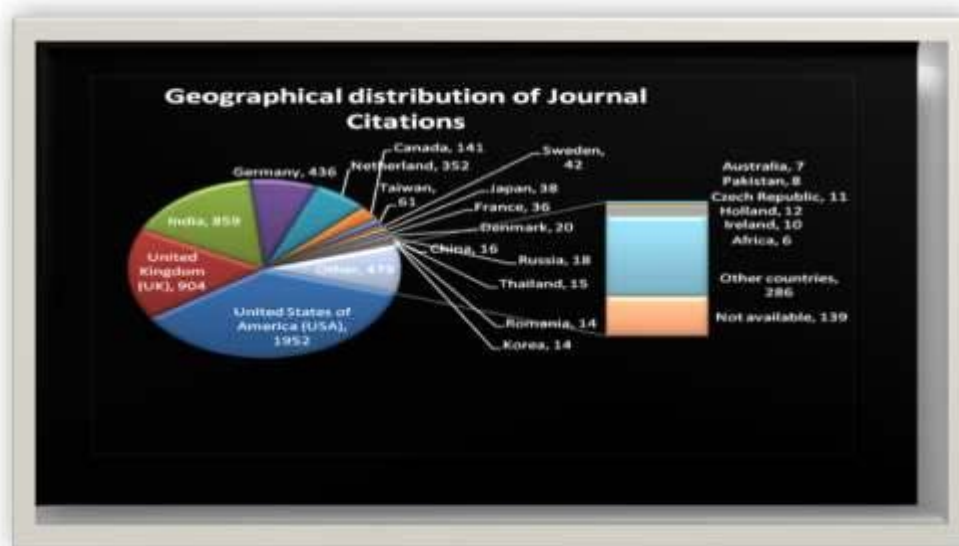
Distributions of Journal are published places scattered geographical places. In this regarding this international periodical directory Ulrich periodical directory through researcher collect the journal publication details and other online resources this details are explained in table -10.

**Table – 10 Geographical Distributions of Journal Citations**

Sl. No	Country	Citations	Cumulative Citations	Percentage	Cumulative percentage
1	United States of America (USA)	1952	1952	36.17	36.17
2	United Kingdom (UK)	904	2856	16.75	52.92
3	India	859	3715	15.92	68.84
4	Germany	436	4151	8.08	76.92
5	Netherland	352	4503	6.52	83.44
6	Canada	141	4644	2.61	86.05
7	Taiwan	61	4705	1.13	87.18
8	Sweden	42	4747	0.78	87.96
6	Japan	38	4785	0.70	88.66
9	France	36	4821	0.67	89.33
10	Denmark	20	4841	0.37	89.70

11	Russia	18	4859	0.33	90.03
12	China	16	4875	0.30	90.33
13	Thailand	15	4890	0.28	90.61
14	Romania	14	4904	0.26	90.87
15	Korea	14	4918	0.26	91.13
16	Holland	12	4930	0.22	91.35
17	Czech Republic	11	4941	0.20	91.55
18	Ireland	10	4951	0.19	91.74
19	Pakistan	8	4959	0.15	91.89
20	Australia	7	4966	0.13	92.02
21	Africa	6	4972	0.11	92.13
22	Other countries	286	5258	5.30	97.43
23	Not available	139	5397	2.58	100.00
	Total	5397		100.00	

Figure – 3 Geographical distributions of Journal citations



The table 10 and figure 3 states that United States of America (USA) publication (1952) citations followed United kingdom (904), India (859) Germany (436), Netherland (352) respectively.

The researcher of zoology studied developed countries journal publications but India (859) publication also cited, it means our research publication also imformative and qualitative.

### 5.10 India and Foreign countries journal publication distribution

The research of zoology cited journal references are published geographically distributed India and foreign countries Table 11 is explained the details.

Table -11 India and foreign countries journal publication distribution

Serial No	Geographical distribution	Citations	Percentage
1	India	859	15.91
2	Foreign Countries	4538	84.09
	Total	5397	100.00

The table - 11 reveal that India (859) citations 15.91% of total citations foreign countries 84.09 % (4538). It shows that India science journal publications also very informative and qualitative.

### 5.11 Bradford's law of scattering

Bradford's law states that "if scientific periodicals are arranged in order of decreasing productivity of articles on a given subject that may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups of zones containing the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be as 1:n:n<sup>2</sup>" where 'n' is a multiplier.

#### 5.10.1. Implementation of Bradford's law

To observation of the appropriateness of the distribution of journals using the verbal formulation of Bradford's Law, the following explanations were made and the results were presented. The first part deals with the verbal formulation of the theory based on the data consisting of whole journal references arranged by their decreasing frequency of citations, while the second part examines the graphical representations based on the same data.

#### 5.10.2. Verbal formulation

The number of cited journals has been arranged by decreasing number of citations. To test the verbal formulation of Bradford's multiplier factor was arrived at by dividing journals of a zone by its preceding zone. Bradford's multiplier was expressed as the ratio of the number of journals in any group to the number of journals in any immediately presiding group. The basis for choosing the three zones was that the percentage error in distribution of citations, among the three zones should be minimum citations.

The distribution of journals and corresponding number of citations in the three zones along with the value of Bradford's multipliers are shown in table no. 12.

**Table- 12 Bradford Zone scattering of journals citations**

Zones	Number of Journals	Percentage of Journals	Number of Citations
1	25	4.18	1820
2	53	8.84	1787
3	521	86.98	1790
Total	599	100	5397

In the present table 12 shows data set it was observed that, , 25 journals in nucleus and they are the most productive journals devoted to Zoology sharing 4.18% of total cited journals. The next zone represented by 53 journals (8.84%). The last zone represented 521 journals which share 86.98% of total cited journals. Each zone has approximately one-third of the total citations. Table -12 reveals the same results and hence the journal data fits well with Bradford's law of distribution. Hence the journals distribution as per the Bradford's Law reveals the ratio 25:53:521

According to Bradford's the zones, thus identifies will form an approximately geometric series in the form 1: n: n<sup>2</sup>: But it was found that the relationship of each zone in the present study is 25:53:521. Bradford's formulated a simple mathematical model to describe reference scattering. Cole statistically explained that "by plotting the cumulative fraction total titles. An approximately linear curve is obtained and the slope of this curve gives a reference scattering which be characteristics of the study".

### 5.12 Distribution of cited journals by decreasing frequencies of citations

**Table -13 distribution of cited journals by decreasing frequencies of citations**

No. of Journals	Cumulative No. of Journals	Log cumulative of Journals	No. of Citations	Total Citations	Cumulative Citations	Percentage of Cumulative Percentage	Percentage of Cumulative Journals
1	1	0.00	147	147	147	2.72	0.17
1	2	0.30	129	129	276	5.11	0.33
1	3	0.48	112	112	388	7.19	0.50
1	4	0.60	104	104	492	9.12	0.67
1	5	0.70	94	94	586	10.86	0.83
1	6	0.78	91	91	677	12.54	1.00
1	7	0.85	82	82	759	14.06	1.17
2	9	0.95	76	152	911	16.88	1.50
1	10	1.00	74	74	985	18.25	1.67
1	11	1.04	72	72	1057	19.58	1.84
1	12	1.08	67	67	1124	20.83	2.00
1	13	1.11	61	61	1185	21.96	2.17
1	14	1.15	60	60	1245	23.07	2.34
2	16	1.20	59	118	1363	25.25	2.67
1	17	1.23	54	54	1417	26.26	2.84
1	18	1.26	53	53	1470	27.24	3.01
2	20	1.30	52	104	1574	29.16	3.34
2	22	1.34	51	102	1676	31.05	3.67
1	23	1.36	49	49	1725	31.96	3.84
1	24	1.38	48	48	1773	32.85	4.01
1	25	1.40	47	47	1820	33.72	4.17
1	26	1.41	46	46	1866	34.57	4.34
2	28	1.45	45	90	1956	36.24	4.67
1	29	1.46	44	44	2000	37.06	4.84
3	32	1.51	43	129	2129	39.45	5.34
3	35	1.54	42	126	2255	41.78	5.84
3	38	1.58	41	123	2378	44.06	6.34
2	40	1.60	40	80	2458	45.54	6.68
2	42	1.62	39	78	2536	46.99	7.01
2	44	1.64	38	76	2612	48.40	7.35
3	47	1.67	37	111	2723	50.45	7.85
2	49	1.69	36	72	2795	51.79	8.18
1	50	1.70	35	35	2830	52.44	8.35
2	52	1.72	34	68	2898	53.70	8.68
1	53	1.72	33	33	2931	54.31	8.85
2	55	1.74	32	64	2995	55.49	9.18
2	57	1.76	31	62	3057	56.64	9.52
2	59	1.77	30	60	3117	57.75	9.85
3	62	1.79	29	87	3204	59.37	10.35
2	64	1.81	28	56	3260	60.40	10.68
3	67	1.83	27	81	3341	61.90	11.19
4	71	1.85	26	104	3445	63.83	11.85
3	74	1.87	24	72	3517	65.17	12.35
2	76	1.88	23	46	3563	66.02	12.69
3	79	1.90	22	66	3629	67.24	13.19
2	81	1.91	21	42	3671	68.02	13.52
2	83	1.92	20	40	3711	68.76	13.86
2	85	1.93	19	38	3749	69.46	14.19
3	88	1.94	18	54	3803	70.47	14.69
2	90	1.95	17	34	3837	71.10	15.03
6	96	1.98	16	96	3933	72.87	16.03
1	97	1.99	15	15	3948	73.15	16.19
4	101	2.00	14	56	4004	74.19	16.86
8	109	2.04	13	104	4108	76.12	18.20
14	123	2.09	12	168	4276	79.23	20.53
7	130	2.11	11	77	4353	80.66	21.70
7	137	2.14	10	70	4423	81.95	22.87
11	148	2.17	09	99	4522	83.79	24.71
7	155	2.19	08	56	4578	84.82	25.88
8	163	2.21	07	56	4634	85.86	27.21
11	174	2.24	06	66	4700	87.09	29.05
23	197	2.29	05	115	4815	89.22	32.89
8	205	2.31	04	32	4847	89.81	34.22
35	240	2.38	03	105	4952	91.75	40.07
86	326	2.51	02	172	5124	94.94	54.42
273	599	2.78	01	273	5397	100.00	100.00

The graphical and verbal interpretation of the Bradford's law of scattering has been applied to the literature of zoology. Table - 13 represents journals arranged in decreasing frequency of citations. To testify the applicability of Bradford's law of scattering

### 5.13 FINDINGS AND RESULT OF THE STUDY

The analysis findings result on the basis of different variables.

1. Bangalore University 2604(37.689%) is highest cited references followed University of Mysore 2468 (35.723%) and Karnatak University 1837 (26.588%).

2. Journals constituted the most frequently used form accounting for 5397 (78.54%) citations of the total cited references.
3. The Bangalore university zoology researcher cited Journals (2026) is the highest followed University of Mysore (2018) and Karnatak University (1353).
4. Zoology researcher highly cited source is Pure Science, Applied science & Medical Science (99%).
5. Zoology researcher referred Zoology (39.118% ) subject journals followed Medical Science (20.938%), Biology (10.043%), science (7.208%), genetics (6.504%), Ecology (4.280%) subject journals
6. The researcher is depending USA (1952) and other developed country journal publications. Indian journal are cited (859).
7. The study confirms that the journal use pattern of zoology researchers fits well with the Bradford's Law of scattering.
8. The findings of the study have grate implication for the need based collection developed in the field of Zoology.

## 5.14 CONCLUSION

The study covers 52 doctoral theses submitted to the department of zoology in three universities of Karnataka. The Zoology researchers are highest source used journals (74.11%). The study reveals that Indian journals 859 (16.75 %) are cited. Zoology researcher referred Indian journals that are top journal titles. That are 3rd, 6th, 8th and 11th ranked Indian journal titles. The topmost journals are USA and UK published titles. This study will help to Zoology researcher and University librarian for collection development process. Not only the collection development it evaluates the resource usage and help to library budget management. The librarian will identify the core journal for subscription.

## REFERENCES

1. Banateppanavar, K. Biradar, B.S. & Kannappanavar, B.U. (2013). Citations analysis of doctoral theses in botany submitted to Kuvempu University, Karnataka India: A case study. *Collection Building*, 32 (1), pp.12-21.
2. Banateppanavar, K. Biradar, B.S. & Kannappanavar, B.U. (2013). Citations analysis of doctoral theses in Biotechnology submitted to Kuvempu University, Karnataka India: A case study. *International Journal of Information Dissemination and Technology*, 3(3), pp.147-157.
3. Baughman, James. (1974). Structural analysis of the literature of sociology. *Library Quarterly*, 44(4), pp. 293-308.
4. Dhanamjaya, M. & Talwar, V.G. (2010). Journal citations in the doctoral dissertations of engineering and technology submitted to the general universities of Karnataka. *SRELS Journal of Information Management*, 47(5), pp. 555-564.
5. Garfield, E. (1983). *Citation indexing: Its theory and application in science, Technology and Humanities*, Philadelphia: ISI Press.
6. Guraraj S Hadagali, B.D. Kumbar and Amrut Benahal (2009) Citation analysis of Ph.D. theses submitted to Karnatak University, Dharwad in the Field of Physics. *Information Studies* 15(2) pp 115-127.
7. Sudhier, K.G. (2010). Application of Bradford's Law of scattering to the Physics Literature: A study of Doctoral Theses Citations at the Indian Institute of Science. *DESIDOC Journal of Library & Information Technology*, 30(2), pp. 3-14.
8. Sangam, S.L. (1986). Citation analysis of doctoral dissertation in Social Sciences accepted by the Karnataka University, Dharwad during 1964 to 1982 (Unpublished Thesis). Gulbarga University, Gulbarga
9. Thanuskodi, S. (2012). Citation analysis of doctoral research in botany submitted to Annamalai University. *International Journal of Library Science*, 1(1), pp.8-12 DOI:10.5923/j.library.20120101.12



### **Y. L. Somashekara**

Research Scholar, Department of Library & Information Science. University of Mysore, Manasagangothri, Mysore.



### **Mallinath Kumbar**

Professor, Department of Studies in Library and Information Science, University of Mysore, Manasagangothri, Mysore.