CITATION ANALYSIS OF THESES SUBMITTED TO JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA JABALPUR DURING 2013 TO 2017

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Abstract

The study was conducted at Central Library of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, India. The primary aim of the study was citation analysis of theses/dissertations of 16 disciplines in which theses/dissertations was submitted during the period 2013-2017. The outcome of the study revealed that a total of (1219) theses/dissertations were submitted with a total of (93806) citations. Journals (74.98%) were the most preferred source of references followed by book (7.51%). Advances (0.69%) and Reviews (0.43%) were the least preferred reference source. Agronomy (14402) fetched maximum citations followed by discipline of Genetics and Plant Breeding (12290) on second place. Least number of citations was in the discipline of Statistics with (767) citations only. The study serves as an important source of information for agricultural librarians and administrators which will facilitate in decision making for selection, subscription and acquisition of useful and required sources of information

Key words: Citation Analysis, Thesis, Theses, Dissertation, Journals, Books, University References

Introduction

Citation analysis is one of the most common methods in library science research. The use of library resources can be effectively investigated through citation analysis of theses/dissertation, in the words van Raan, (2003) evaluation of scientific research is crucial. Post-Graduate and Doctorate research programmes are important for research expansion and development. The findings develop new information and generate knowledge and dissertations are a good reflection of the predominant lines of work and research at universities and other academic institutions (Ardanuy *et al* 2009). Also advancement in science and technology is dependent upon the scientific work done and is brought in front of the public through publications, assessment has a key role if taken positively for further improvement and excellence (Nayak *et al* 2011).

Literature review

Citation analysis is defined as an activity involving analysis of citation on reference forms a part of primary scientific communication (Martyn, 1965). In other word as quoted by Tandale (2017) citation analysis is a bibliometrics technique in which work cited in publications are examined to determine pattern of scholarly communication. According to Lahiri (1996) citation analysis is one of the research methods, generally used for user studies, in the words of Shah *et al* (2016) citation analysis studies are frequently used to assess the research publication and to generate information that could be used by policy makers and experts. Citation of research articles plays a significant role in academic and research circles as it is a parameter to know the importance of literature taken from reference and to know how the sources has been effectively utilized (Sankar, 2019).In the words of Thaoudin (1998) citation analysis is an important tool used by the librarian, teachers and information scientist to represent the relationship which exists between cited and citing document. Similarly Singh and Chauhan, Ramkesh (2019) reported that citation analysis is used to know which journals are most productive in a particular field of knowledge.

Becker and Chiware, (2015) examined the citation patterns of masters' theses and doctoral dissertations between 2005 and 2014 in the Faculty of Engineering at the Cape Peninsula University of Technology (CPUT) and concluded that both masters' and doctoral students are utilizing resources provided by the library and the most used resources were journals, followed by books. Athalye (2018) communicated that citation helps the library to select the core journals, to keep the records of the specific subject in a systematic manner and to know the changing trends in that subject area.

Methodology (Materials and Methods)

The present study is a part of Post-Graduate and Doctoral work done during 2018-2021 at Central Library, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh India. The study was concentrated on the theses submitted to the repository of this library during the period 2013- 2017. The data on the number of theses submitted was taken from the accession register other required details were also noted down. Citation analysis is generally used to know the details of references/bibliography. All aspects of citations were considered and data on Journals, Books, Theses, Reports, Conference, Seminars, symposiums, Reviews, Bulletins, Advances, Govt. Publications, E-Resources, Others (Patents, Abstract, Manual, Case study, survey, Series) etc was collected. The collected data was physically/manually verified from the original theses/dissertations. The collected data was later on classified, compiled, tabulated manually and later on it was analyzed using MS Excel software package to draw various results, inferences and conclusions.

Result and Discussion

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur offers Post-Graduate and Doctoral programmes in following departments during the study period, Agricultural Economics and Farm Management, Agricultural Statistics, Agronomy, Entomology, Extension Education, Farm Machinery and Power Engineering, Food Science and Technology, Forestry, Genetics and Plant Breeding, Horticulture, Molecular Biology and Biotechnology, Plant Pathology, Plant Physiology, Post Harvest Process and Food Engineering, Soil and Water Engineering, Soil Science and Agricultural Chemistry. All the disciplines are related to agriculture

The data presented in table 1 and depicted by figure 1 clearly shows that maximum number of theses (277) were submitted during the year 2016 followed by year 2013 (244) and 2017 (243). The least number of theses were submitted in the year 2015 (217). From the figures it was noted that submission of theses did not follow any particular trend.

Table 1. Year wise submission of theses in various disciplines in agriculture science

S. No.	Year	No. of Theses/dissertations	Rank
1	2013	244	2
2	2014	238	4
3	2015	217	5
4	2016	277	1
5	2017	243	3
	Total	**1219**	

Figure 1. Year wise submission of theses in various disciplines in agriculture science

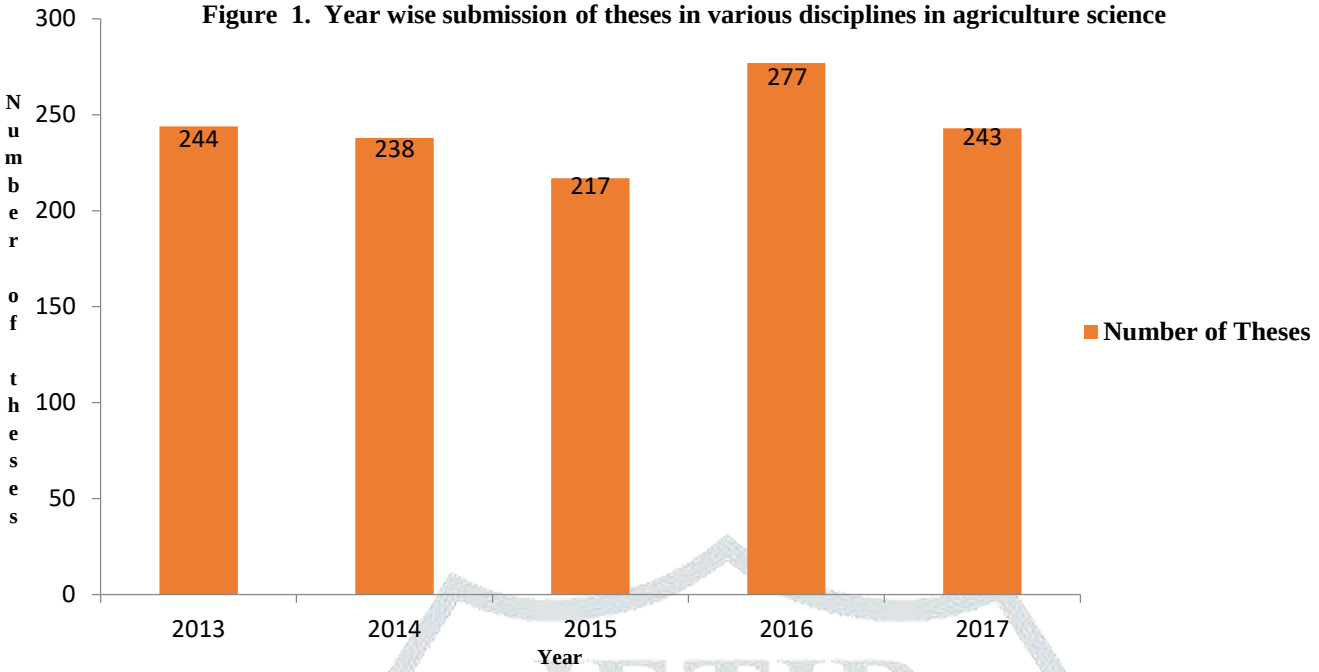


Table 2 and figure 2 represents a clear picture about the most preferred sources of information used by students in their theses/dissertation work. A total of 1219 (Table -1) theses/dissertations were deposited to the repository of Central Library, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur. The theses/dissertations covered the 16 disciplines in which the Post-Graduate and Doctoral degree is awarded.

The bibliography of submitted theses/dissertations was analyzed for the following sources of information, Journals, Books, Theses, Reports, Conference, Seminars, symposium, Reviews, Bulletins, Advances, Govt. Publications, E-Resources and Others(Patents, Abstract, Manual, Case study, Survey, Series etc).

Agronomy

Citations in Agronomy (Table 2 and Figure 2) showed a distinct order, maximum number of citations are from Journals (9906) followed by Books (2269), Conference, Seminar, Symposium (623) and Thesis (421).Whereas comparatively lesser number of citations were received from Others (Patents, Abstract, Manual, Case study, Survey, Series), Govt. Publications, Reports, Advances, E-Resources and Review amounting to (411), (246), (184), (167), (73) and (52) citations respectively. Least number of citations was received from Bulletins which accounted for only (50) citations. Highest number of overall citations was also received by Agronomy (14402) discipline. Similar results in case of journals was also reported by Williams and Fletcher (2006) and Olatokun and Makinde (2009). Parameswaran and Rekha (2003) conducted a study and revealed that Books and Journals articles are the most frequently cited items.

Agricultural Economics and Farm Management

A total of (2859) citations were quoted in theses/dissertations of this discipline. It is evident from Table 2 and Figure 2 that Journal (1856) accounted for maximum citations followed by Others (Patents, Abstract, Manual, Case study, survey, Series) with (531) citations. Thesis, Reports and Books accounted for (112), (89) and (79) citations each respectively. Whereas Conference, Seminar and symposium got (75) citations followed by E-Resources with (38) citations and Review with (32) citations. Govt. Publications fetched (26) citations followed by Bulletin with (17) citations. Lowest number of citations was from Advances with only (4) citations, similar results were also quoted by Osman *et al* (2018) who confirmed that Journal articles were the most cited publications, followed by books, reports and web resources.

Entomology

Entomology is a branch of zoology dealing with the scientific study of insects (Britannica, 2019). In this subject the total number of citations was(5636) in which the journals (4275) were most cited followed by Thesis (311), Books (272) and Others (Patents, Abstract, Manual, Case study, survey, Series) with (258) citations. Conference, Seminar, Symposium obtained (193) citations whereas Bulletin and Govt. Publication gained (94) and (46) citations. E-Resources and Reports got (81) and (69) citations in that order. Advances and Reviews got least citations with (19) and (18) citations each respectively. Comparable results were also reported by Pancheshnikov, (2007) who found that Journals are one of the most commonly used research tools

Extension Education

It is one of the important disciplines of Agricultural Sciences. Post-Graduate and Doctoral theses/dissertations of Extension Education received (8377) citations. Maximum number of citations were from Journals (4453) followed by Thesis (2391), Conference, Seminar, Symposium (502) and Others (Patents, Abstract, Manual, Case study, Survey, Series) which resulted in (377) citations while Books received (224) citations followed by Reports (145), Review (112) and E-Resources (86). Lesser number of citations was from Govt. Publications (51), Bulletin (25) and Advances (11). Osman *et al* (2018) also confirmed that students prefer journal publications to all other forms of publications, since journal articles are topic oriented, they are often the first point of call for most Post-Graduate students.

Farm Machinery and Power Engineering

The department of Farm Machinery and Power Engineering comes under the Faculty of Agricultural Engineering. Table 2 and figure 2 reveal that a total of (2614) citations were obtained during the study period. On categorization it was found that the highest number of citations were of Journals (1761) followed by others (Patents, Abstract, Manual, Case Study, Survey, Series) with (193) citations. Books received (189) citations, Thesis received (161) citations and Conference, Seminar, and Symposium received (111) citations. Other reference sources like Reports (70), E-Resources (50), Bulletin (36) and Govt. Publications (21) received comparatively lesser citations. Least citations were received by Reviews and Advances each having (11) citations. The results are is concurrence with those of Gohain and Saikia (2014) who examined the referencing pattern among Ph.D. students in the chemical sciences and revealed that the most preferred informational source used by Ph.D. students was journal publications or articles.

Food Science and Technology

Table 2 and figure 2 expose the fact that a total of (2403) citations were received by the department. On analysis it was found that Journals accounted for (1857) citations followed by Books (200), Others (Patents, Abstract, Manual, Case study, survey, Series) accounted for (163) citations while thesis fetched (57) citations and Conference, Seminar, Symposium gained (52) citations. As compared to above lesser citations were received by E-Resources (25), Govt. Publications (19), Bulletin (12), Reports (11), Advances (4) and Review (3). Sam (2008) reports that a majority of the items cited were journals followed by books.

Forestry

In the Forestry discipline total number of citation received was (1974) (Table 2 and figure 2) out of which (1399) citations were from Journals. Books (183) was the second most cited reference followed by others (Patents, Abstract, Manual, Case study, Survey, Series) with (116) citations and Conference, Seminar, Symposium accounted for (81) citations. Fewer citations were credited to Thesis (79), Reports (56), Advances (16), Govt. Publications (16) and E-Resources (10). Least citations were received by Review and Bulletin amounting to (9) each. Equivalent findings were also quoted by Nayak *et al* (2013) who found that Journals was the highest cited reference source.

Genetics and Plant Breeding

The present study reveals that the theses/dissertation of this department gained second highest number (12290) of citations after discipline Agronomy Table 2 and figure 2. As is the case with other departments here also the Journals gained huge amount of citations (10520) followed by Books, (650), Conference, Seminar, Symposium (290), Thesis, (246) and Others (Patents, Abstract, Manual, Case study, survey, Series) with (224) citations. Somewhat lesser number of citations was congregated by Advances (132), E-Resources (77), Reports

(56), Bulletin (44) and Govt. Publications (36) whereas the lowest number of citations was under Review (15). Comparable finding were also reported by Anil kumar and Rajaram (2013) who found that Journal articles are used (cited) the most, followed by books and other documents like proceedings and reports.

Horticulture

Horticulture is one of the important branches of agriculture. On seeing Table2 and figure 2 it is obvious that Horticulture discipline received (9565) citations in which Journals alone fetched (8110) citation followed by Books with (482) citations. Conference, Seminar, Symposium received (261) followed by Others (Patents, Abstract, Manual, Case study, Survey, Series) with (208) citations and Thesis with (206) citations. Additional sources of references like Advances (68), E-Resources (68), Bulletin (60), Govt. Publications (56) and Reports (34) also fetched citations. Lowest number of citations was obtained by Reviews which got only (12) citations. The results are in accordance with Dillip (2014) who reported that journals as most preferred sources of information followed by books, proceedings and reports.

Molecular Biology and Biotechnology

It a relatively newer discipline as compared to other disciplines and is offered under Biotechnology Department of the University. Table 2 and figure 2 elucidate that a total of (2686) citations were received under Molecular Biology and Biotechnology discipline out of which (2206) were from Journals only whereas Books accounted for (138) citations, Others (Patents, Abstract, Manual, Case study, Survey, Series) obtained (90) citations followed by Conference, Seminar, symposium with (68) citations and E-Resources with (58) citations. Other sources of literature like Bulletin (30), Review (27) , Thesis (24), Govt. Publications (18) and Reports (16) received lesser citations whereas Advances with (11) citations was least cited reference source. Similar results were reported by Vaishali (2011) who analyzed (1151) citations and observed that Journals accounted highest number of citations followed by books, web resources, seminar/conferences/ workshop/symposium and news papers.

Plant Pathology

Table2 and figure 2 portray the fact that total number of citations received during the study period was (6837), Out of which maximum citations was received by Journals (5142) followed by Books (521), Others (Patents, Abstract, Manual, Case study, Survey, Series) (352) and Conference, Seminar, Symposium got (214) citations. Relatively lesser number of citations was received by Thesis (196), Bulletin (142), Reports (102), E-Resources, (56), Govt. Publications (46) and Review (35). Least number of citations was received by Advances (31). Similar findings was reported by Nkiko and Adetoro (2007) who found that books were cited most frequently followed by journal citations, Internet/e-resources, newspapers, conference proceedings, unpublished research project/dissertations, grey literature, which includes monographs, pamphlets, and unpublished papers (2.7%), however studies such as Kraus (2002) and Gooden (2001) reported that journals are more cited than books.

Post Harvest Process and Food Engineering

This discipline comes under the Faculty of Agricultural Engineering, both Post-Graduate and Doctoral programmes are being run by the department. Collectively (2615)(Table 2 and figure 2) citations were gathered. Journals amounted for (1910) citations followed by Books (315), Thesis (101), Conference, Seminar, Symposium (90) Others (Patents, Abstract, Manual, Case study, Survey, Series) (87) and E-Resources (50). Among other sources of citation Bulletin fetched (19) citations followed by Govt. Publications (15), Reports (12), Review (10) whereas Advances was least consulted and could gather only (6) citations. Similar results were reported by Buchanan and Herubel (1994) who in their study concluded that scientific journals represent the biggest proportion of materials cited in the dissertations

Plant Physiology

It is apparent from Table2 and figure 2 that (7633) citations was received which were contributed by summing up different sources of information which included Journal (6352), Books (395), Others (Patents, Abstract, Manual, Case study, Survey, Series) with (231) citations and further followed by Conference, Seminar, Symposium with (189) citations, Thesis (147) citations, Advances(110) citations, Reports and Govt. Publications with (54)and (46)citations respectively. Whereas, E-Resources, Bulletin and Review received (43),

(42) and (24) citations each respectively. Least number of citations was received by Review (24). Geetha *et al* (2016) also reported similar findings and found that Journals are the most dominant form of information cited followed by books, conference proceedings, Handbook and Encyclopedia.

Soil Science and Agricultural Chemistry

Soil Science and Agricultural Chemistry is one of the core departments of Faculty of Agriculture engaged in basic and applied research. As presented in Table 2 and figure 2 it is clear that the department received (9089) citations. The maximum number of citations was obtained by Journals (7531), followed by Books (635) where as Conference, Seminar, Symposium fetched (235) citations Others (Patents, Abstract, Manual, Case study, Survey, Series) earned (201) citations Thesis achieved (157) citations and Govt. Publications got (96) citations. Lesser number of citations were received by Bulletin (76), followed by Reports (51), E-Resources (43), Advances (41) and Review (23) was the last on the list with minimum number of citations. Similar results were also reported by Singh and Chauhan, (2019) who reported that Journal and books are most preferred source of information followed by reports, Govt. Publication, conference and seminar proceedings and thesis.

Statistics

The Department of Statistics falls under the faculty of Agriculture. Statistical analysis is an essential part of all research work carried out the University. Table2 and figure 2 establish the fact that only (767) citations in total was confined to this department out of which majority of citations went to journals (572) followed by Books (62), Thesis and Others (Patents, Abstract, Manual, Case study, Survey, Series) with (37) citations each followed by Conference, Seminar, Symposium with (32) citations and Reviews with (9) citations. Very few citations were received by Reports (5), Advances (5), Bulletin (4) and E-Resources (3).Whereas the Govt. Publications could fetch only (01) citations. The above results are in line with the findings of Okafor and Ukwoma (2007) who discovered that journals are more frequently used than other resources.

Soil Water Engineering

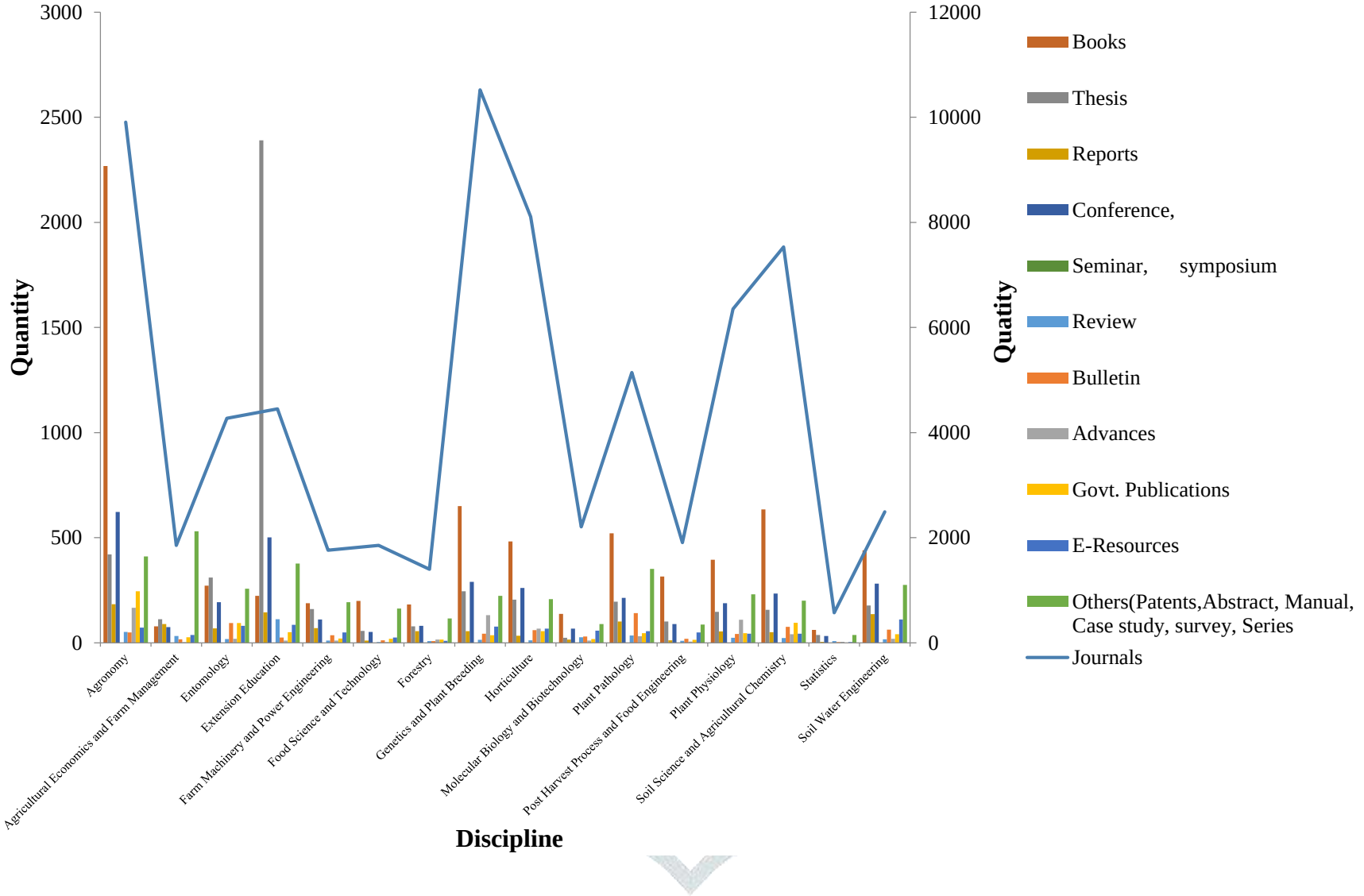
This discipline comes under Faculty of Agricultural Engineering. Here also on viewing the Table 2 and figure 2 we can conclude that the theses/dissertation during study period fetched (4059) citations. Highest number of citations was collected by Journals (2495), then Books (440), Conference, Seminar, symposium (282), Others (Patents, Abstract, Manual, Case study, Survey, Series) with (276) citations further followed by Thesis (178), Reports (137) and E-resources with (111) citations. The other sources of references like Bulletin, Govt. Publications Advances and Review were given less importance and could fetch only (63), (41), (19) and (17) citations each respectively. Similar results were also reported by Yap and Kozhayeva (2019) who found that students cite more journal articles compared to print books and only a few students cited thesis and conference proceedings whereas Tuñón and Brydges (2008) who found that the percentage of online resources is very low when compared with other information sources.

Table 2. Most preferred sources of information used by students

Subject	Journals	Books	Thesis	Reports	Conference, Seminar, Symposium	Review	Bulletin	Advances	Govt. Publications	E-Resources	Others (Patents, Abstract, Manual, Case study, survey, Series)	Total no. of citations
Agronomy	9906	2269	421	184	623	52	50	167	246	73	411	14402
Agricultural Economics and Farm Management	1856	79	112	89	75	32	17	4	26	38	531	2859
Entomology	4275	272	311	69	193	18	94	19	46	81	258	5636
Extension Education	4453	224	2391	145	502	112	25	11	51	86	377	8377
Farm Machinery and Power	1761	189	161	70	111	11	36	11	21	50	193	2614

Engineering												
Food Science and Technology	1857	200	57	11	52	3	12	4	19	25	163	2403
Forestry	1399	183	79	56	81	9	9	16	16	10	116	1974
Genetics and Plant Breeding	10520	650	246	56	290	15	44	132	36	77	224	12290
Horticulture	8110	482	206	34	261	12	60	68	56	68	208	9565
Molecular Biology and Biotechnology	2206	138	24	16	68	27	30	11	18	58	90	2686
Plant Pathology	5142	521	196	102	214	35	142	31	46	56	352	6837
Post Harvest Process and Food Engineering	1910	315	101	12	90	10	19	6	15	50	87	2615
Plant Physiology	6352	395	147	54	189	24	42	110	46	43	231	7633
Soil Science and Agricultural Chemistry	7531	635	157	51	235	23	76	41	96	43	201	9089
Statistics	572	62	37	5	32	9	4	5	1	3	37	767
Soil Water Engineering	2495	440	178	137	282	17	63	19	41	111	276	4059
Total	**70345**	**7054**	**4824**	**1091**	**3298**	**409**	**723**	**655**	**780**	**872**	**3755**	**93806**
Percentage	74.98%	7.51%	5.14%	1.16%	3.51%	0.43%	0.77%	0.69%	0.83%	0.92%	4.0 %	100%

Figure 2. Most preferred sources of information used by students



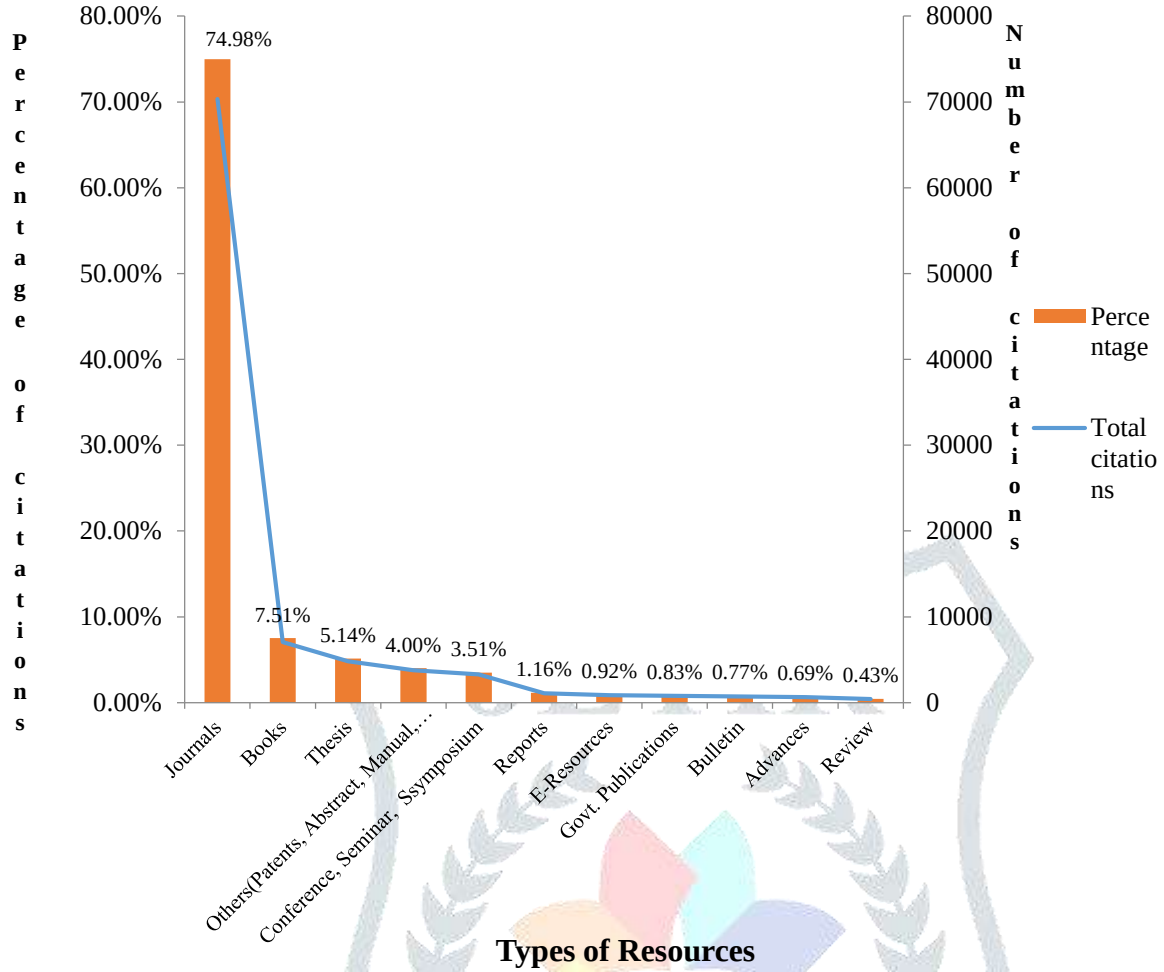
It is clear from table 3 and figure 3 that a total of (93806) citations were gathered by (1219) theses/dissertations during the five year study period from 2013 to 2017. It quite apparent that Journals with (70345) citations and 74.98% was the highest used reference source among all the other sources of reference, similar results were reported by Pillai (2007) and Deshmukh (2011). Books with (7054) citations was on the second rank with 7.51% overall citations, similar results were Chikate and Patil (2008) and Buttlar (1999) who found that Books was the most cited reference source after Journals whereas Jadhav *et a*l (2011) and Jan (2009)established the fact that books were most cited documents. The third highest quoted reference source was Thesis with (4824) citations and 5.4%. On the fourth place was Others (Patents, Abstract, Manual, Case study, survey, Series) with (3755) citations and at 4.0 % of total citations followed by Conference, Seminar, Symposium on the fifth place with (3298) citations at 3.51% of total citations. On the sixth place was quoting of Reports with (1091) citations and 1.16% total citations. All further quoted references like E-Resources (872 & 0.92%), Govt. Publications (780 &0.83%), Bulletin (723 & 0.77%), Advances (655 & 0.69%) and Review (409 & 0.43%) were quoted in very meager number and occupied seventh, eighth, ninth, tenth and eleventh position respectively. Reviews were the least cited reference source. Advances and Reviews were the least cited sources of information the main reason behind it could be the fact that Advances and Reviews are not available in all the libraries and are very costly.

Similar results were quoted by Kalbande and Trayambakrao (2012) who reported that after Journals and Books, Government Publication was cited and remaining citations were collected from Thesis, News Papers, Web Sites, and Gazetteers. Similarly Kushkowski, *et al* (2003) found that Biological Sciences uses the largest proportion of journals while Arts and Humanities use the smallest proportion of journals. Comparably Osman (2018) also reported similar results which indicated that Reports, Public Lectures and Dictionary/Encyclopedias receive fewest citations whereas Borthakur (2015) reported that Journals was the most preferred form of literature as compared to web/internet resources and other forms of literature and in the words of Satpute and Sonawane (2014) Thesis, Conference and Websites were the most cited documents after Journals and Books.

Table 3. Total sources of information and their percentage

Rank	Sources of information	Total citations	Percentage
1	Journals	70345	74.98%
2	Books	7054	7.51%
3	Theses	4824	5.14%
4	Others (Patents, Abstract, Manual, Case study, survey, Series)	3755	4.0 %
5	Conference, Seminar, Symposiums	3298	3.51%
6	Reports	1091	1.16%
7	E-Resources	872	0.92%
8	Govt. Publications	780	0.83%
9	Bulletins	723	0.77%
10	Advances	655	0.69%
11	Reviews	409	0.43%
	Total No. of Citations	**93806**	**100%**

Figure 3. Total sources of information and their percentage



Conclusion

1. The study revealed that during the study period 2013-2017 a total of 1219 theses/dissertations were deposited to the Central Library and the total number of citation collection was 93806.
2. The number of theses/dissertations submitted each year varies from year to year and is non significant
3. This particular study suggests that students of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur prefer journal publications as their 1st choice in reference quoting, and it is evident from the findings of all the disciplines that is Agronomy, Agricultural Economics and Farm Management, Entomology, Extension Education, Farm Machinery and Power Engineering, Food Science and Technology, Forestry, Genetics and Plant Breeding, Horticulture, Molecular Biology and Biotechnology, Plant Pathology, Post Harvest Process and Food Engineering, Plant Physiology, Soil Science and Agricultural Chemistry, Statistics and Soil Water Engineering
4. The second most preferred source of information was books but it varied according to discipline Out of a total of 16 disciplines books was the second most preferred in 12 disciplines. Books were the second most preferred source of information for disciplines Agronomy, Food Science and Technology Forestry, Genetics and Plant Breeding, Horticulture, Molecular Biology and Biotechnology, Plant Pathology, Post Harvest Process and Food Engineering, Plant Physiology, Soil Science and Agricultural Chemistry, Statistics and Soil Water Engineering.
5. As far as the disciplines of Entomology and Extension Education are concerned Thesis was the second most cited source of information whereas for the disciplines Agricultural Economics and Farm Management and Farm Machinery and Power Engineering others (Patents, Abstract, Manual, Case study, Survey, Series) most cited source of information.
6. Advances and Reviews were the least cited sources of information.
7. It is clear from the tables that in Agriculture University dissimilarity exists between different disciplines as far as sources of information is concerned.

8. Quoting of references in theses/dissertations depend upon the author of the theses/dissertations and his/her supervisor/guide.
9. Quoting of references in the submitted theses/dissertation also reveal the fact the Central Library of the University was successful in fulfilling the information needs of Post-Graduate and Doctoral scholars.
10. The results of the study are useful in the terms that Librarians and Administrators can use the findings for effective, efficient and useful collection development for the benefit of agricultural fraternity.

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