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Trends in Horticulture Literature in India: A Scientometric Analysis

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Abstract **- This paper analyse the trends of Horticulture literature in India during 2008-2017.It emphasize on year wise distribution, authorship pattern and collaboration of authors, document wise distribution, ranking of journals in the field and position of India among other collaborative countries. The data were collected from web of science database. Total 1427 records are retrieved. The study reveals that fluctuating trend in the growth of literature during study period. However highest number of records found to be in 2016. Multiple authorship is predominant. Degree of collaboration is 0.90.Journal of Evolution of Medical and Dental Science were identified as most productive journal followed by Current Science. India contributes majority of publication in the field of horticulture literature.**
Keywords: **Scientometric Analysis, Research Output, Horticulture, Web of Science, HistCite**

I. INTRODUCTION

Scientometrics is a discipline which analyses scientific publications to explore the structure and growth of science. It analyse various quantitative or qualitative aspects of a publication. It is a scientific field that studies the evolution of science through some quantitative measures of scientific Information, as the number of scientific articles published in a given period of time, mapping of literature, collaborative nature and their citation impact, etc. Scientometric studies are important to know the current developments in the field and a part of science policy making. The history of science and technology, philosophy of science and sociology of scientific knowledge are the related fields of Scientometrics.

Horticulture is the science and art of growing plants (fruits, vegetables, flowers, and any other cultivar). It also includes plant conservation, landscape restoration, soil management, landscape and garden design, construction, and maintenance, and arboriculture. In contrast to agriculture, horticulture does not include large-scale crop production or animal husbandry. Horticulture even refers to the growing horticulture has a very long history.[4] The study and science of horticulture dates all the way back to the times of Cyrus the Great of ancient Persia, and has been going on ever since, with present-day horticulturists such as Freeman S. Howlett and Luther Burbank. The origins of horticulture lie in the transition of human communities from nomadic hunter-gatherers to sedentary or semi-sedentary horticultural communities, cultivating a variety of crops on a small scale around their dwellings or in specialized plots visited occasionally during migrations from one area to the next (such as the "milpa" or maize field of Mesoamerican cultures). A characteristic of horticultural communities is that useful trees are often to be found planted around communities or specially retained from the natural ecosystem of plants in a field or garden. (http://Wikipedia-horticulture).

II. REVIEW OF RELATED LITERATURE

A study by the Soumen Teli and Bidyarthy Dutta(2017) analysed superconductivity research in India during 1989 to 2014.It found that there is a significant difference in Indian output to that of world output and also number of core journals in these area of research is very less. Jinu S Rajan and Vijayakumar (2017) conducted a study of publication of library and information science faculty members in south India during1995-2014. The study reflected most productive year, authorship trend, degree of collaboration and core journal in the field. Sivasekharan and Asok kumar (2015) revealed thorium literature output during 2000-2014.It showed that significant increase in the yearly output of Thorium research. As compared to global contribution Indian contribution in terms of publication is second place. Babha Atomic Research Centre is the most productive institution in this field. A study carried out by Gopikuttan and Aswathy (2014) analysed that research productivity of University of Kerala based on the data collected from web of science over a period of thirteen years from 2000 to 2012.Vinitha et. al., (2010) reflected research productivity of water resource management in India. Swine flu research in India has been analysed by Sivakami and Bhaskaran (2015).It found that swine flu research in India in terms of journal articles authors increased in linear trend.

III. OBJECTIVES OF THE STUDY

The major objective of the study is to find out trend of horticulture research during 2008-17.The specific objectives of the study are following.

1. To calculate year wise growth of publication.
2. To find out the author productivity.
3. To determine the degree of collaboration.
4. To find out the source of publication.
5. To explore the institution wise distribution.
6. To analyse the journal wise distribution.
7. To study the country wise distribution of publication.

IV. METHODOLOGY

The present study is to determine the overall growth of literature in horticulture during the year 2008-2017.The data was collected from web of science, a bibliographic database. Total 1427 records were retrieved. The retrieved data were analysed using HistCite software and MS Excel worksheet.

V. ANALYSIS AND INTERPRETATION

A. Year Wise Analysis

The research output of horticulture literature during 2008-2017 is shown in table I.

TABLE I YEAR-WISE DISTRIBUTION OF PUBLICATIONS

S. No.	Publication Year	No. of Publications	Percentage	TLCS	TGCS
1	2008	33	2.31	17	337
2	2009	90	6.31	59	978
3	2010	73	5.12	38	719
4	2011	146	10.23	69	1013
5	2012	50	3.50	17	272
6	2013	148	10.37	54	607
7	2014	103	7.22	38	407
8	2015	241	16.89	56	577
9	2016	311	21.79	21	288
10	2017	232	16.26	7	80

It is found that there is a fluctuating trend in the number of publications over time during the period under study. The year 2016 shows the highest number of (21.79%) publications followed by 2015 (16.89%) and 2017(16.26%). 2008 was observed as the least productive (2.31%).

B. Authorship Pattern of Publication

Table II represents the distribution of papers based on the no. of authors.

TABLE II AUTHORSHIP PATTERN

S. No.	Author	No. of Publications	Percentage
1	Single author	138	9.67
2	Two author	289	20.25
3	Three author	314	22.00
4	four author	218	15.28
5	Five or more author	468	32.80
	Total	1427	100.00

Table II shows that single authored (9.67%) papers are very less that of multiple authors. five or more author (32.80%) publication are high followed by three author (22%), two author(20.25%) contribution. It is clear that multiple authorship is predominant.

C. Prolific Author

TABLE III PROLIFIC AUTHOR

S. No.	Author	Records	TLCS	TGCS
1	Thankappan K R	23	15	121
2	Manimohan P	19	14	45
3	Kumar S	14	1	56
4	Sarma PS	14	8	92
5	George S	12	0	25
6	Joseph S	12	11	92
7	Latha KPD	12	10	22
9	Raghavan R	12	11	77
10	George B	11	5	18
11	Kumar A	11	2	94
12	Mini GK	11	1	44
13	Nichter M	11	5	65
14	Sivadasan M	11	9	50
15	Thomas S	11	1	27

Table III depicts that Thankappan K R ranks first contributing 23 publications and is the top ranked author. Next is the order is Maniomohan P with 19 publications. This is followed by Kumar S with14 publications.

D. Degree of Collaboration

Degree of collaboration is defined as the ratio of the no. of collaborative research papers to the total number of research papers in the discipline during a certain period of time. The formula proposed by C Subramanyam was used for this study. According to him the degree of collaboration

$$C=Nm/Nm+Ns$$

Where,
C=Degree of collaboration in a discipline
Nm=No. of multi authored papers in the discipline
Ns=No.of Single authored papers in the discipline

In this study, degree of collaboration is
C=1289/1427
=0.90

E. Institution Wise Distribution

There are number of Institutions in India are engaged in horticulture research. The top most institutions are given in Table IV.

TABLE IV INSTITUTION WISE DISTRIBUTION

S. No.	Institution	Records	Percentage	TLCS	TGCS
1	Govt. Medical Colleges	90	6.31	9	142
2	University of Kerala	79	5.54	45	383
3	University of Calicut	57	3.99	19	129
4	Sree Chitra Tirunal Institute of Medical Science & Technology	54	3.78	21	266
5	Cochin University of Science & Technology	49	3.43	15	427
6	Kerala Agricultural University	31	2.17	18	198
7	Centre of Development Studies	25	1.75	9	82
8	Rajiv Gandhi Centre Biotechnology	25	1.75	10	116
9	Regional Cancer Centre	23	1.61	8	258
10	Central Marine Fisheries Research Institute	22	1.54	4	43
11	CSIR	20	1.40	6	116
12	Centre of Earth Science Studies	19	1.33	27	116
13	Indian Institute Technology	19	1.33	12	103
14	Mahatma Gandhi University	19	1.33	2	108
15	Kerala Forest Research Institute	18	1.26	2	47

From table IV, shows that government medical colleges produces most number of publications, followed by university of Kerala with 79 records. Kerala agricultural university produces 31 records. Among these institutions KFRI, MG University, IIT and centre for earth science studies occupy the last position with 19 publications.

F. Document Type Distribution

The publications were categorised based on their form, as journal articles, conference/seminar papers, books, book chapter, theses and dissertations, reports, patents, etc. The document wise distribution of publications given in table V.

TABLE V DOCUMENT WISE DISTRIBUTION

S. No.	Document Type	Records	Percentage
1	Article	1275	89.35
2	Meeting Abstract	35	2.45
3	Letter	32	2.24
4	Review	25	1.75
5	Editorial Material	18	1.26
6	Book Chapter	16	1.12
7	Proceedings Paper	18	1.26
9	Editorial Material	4	0.28
10	Retracted Publication	1	0.07
11	Biographical-Item	1	0.07
12	Book Review	1	0.07
13	News Item	1	0.07

Table V clearly shows that majority of the publications are articles (89.35%) followed by meeting abstract (2.45%) and letters (2.24%).Among these retracted publication, Biographical item, Book review, News item are negligible.

G. Journal Wise Distribution

Journals are the most important channel for research communication. Journal wise distribution of articles helps to find out the core journals in a subject field, in which majority of papers appeared. Major 15 journals with publications are given in table VI.

TABLE VI JOURNAL WISE DISTRIBUTION

S. No.	Journal	Records	TLCS	TGCS
1	Journal of evolution of medical and dental sciences	65	0	1
2	Current science	47	13	137
3	Indian journal of fisheries	45	7	51
4	Zootaxa	36	10	83
5	Phytotaxa	34	8	68
6	Journal of the geological society of India	21	22	75
7	Indian journal of economics and development	16	0	0
8	International journal of scientific study	14	0	2
9	Indian journal of traditional knowledge	13	3	65
10	Environmental earth sciences	12	1	68
11	Indian journal of medical research	12	7	60
12	Journal of clinical and diagnostic research	12	0	5
13	Journal of environmental biology	12	1	38
14	Annals of Indian academy of neurology	11	2	46
15	Environmental monitoring and assessment	11	5	35

It is clearly shows that Journal of Evolution of Medical and Dental Science published most with 65 articles. Indian Journal of Fisheries and Zootaxa come in third and fourth position with 45 and 36 papers respectively. Among these 15 journals, Annals of Indian Academy of Neurology and Environmental Monitoring and Assessment are in the last position with 11 publication.

H. Country Wise Distribution

TABLE VII COUNTRY WISE DISTRIBUTION

S. No.	Country	Records	TLCS	TGCS
1	India	1423	375	5264
2	USA	94	24	726
3	UK	30	11	151
4	Japan	24	10	270
5	France	18	10	260
6	Australia	16	7	167
7	Canada	15	7	95
8	Germany	14	6	69
9	Netherlands	13	5	71
10	Saudi Arabia	10	6	42
11	Malaysia	8	7	30
12	South Africa	8	2	45
13	Finland	6	4	40
14	Peoples R China	5	3	40
15	Sweden	5	0	49

From table VII, it is found that the contribution of India is maximum when compared with other countries. India collaborated with other countries such as USA, UK, Japan, etc.

VI. FINDINGS OF THE STUDY

The major findings of the study are mentioned below.

1. The study observed a fluctuating trend in horticulture literature during 2008-2017.The year 2016 shows highest number of publications.
2. Collaborative authorship is dominant than that of single author.
3. The degree of collaboration is 0.90.
4. Among institutions, Government medical colleges top with highest number of publications.
5. Majority of the publications are in the form of journal articles.
6. Among the journals in which publications appeared Journal of Evolution of Medical and Dental Science publication were identified as the most productive journal.
7. Majority of contributions are from India followed by USA.

VII. CONCLUSION

Horticulture is one of the important branch of agriculture concern with garden crops. It plays vital role in diet, medicinal purpose, entertainment, environment, aesthetic value and economic value. Many institutions like agricultural universities, medical colleges, R&D institutes and other institutions are engaged for research in this area. The evaluation of research output in this area is necessary. Hence the study depicts latest trend in horticulture literature in India.

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