

## Scientometric Analysis of Plant Nematology Research Output in the Global Context

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**ABSTRACT:** The present study is about an analysis which reveals the scientometric analysis of plant Nematology research publications. It indicates the qualitative and quantitative analysis description and techniques which has been applied. The study period has twenty years from the year 2002 to 2021. The plant Nematology research extracted the Web of Science database which has been taken for the analysis and also to motivate the future researches in Plant nematological aspects. The scientometric analysis research to find out the various subjects and disciplines also measured in the further research It will more helpful for the researchers community.

**Keywords:** Scientometric, Plant Nematology, Global Context.

### INTRODUCTION

In the field of Agricultural Sciences one of the important component in the Plant Nematology subjects in the Plant Sciences. Nowadays plant nematodes are most important pest in Agricultural and Horticulture crops in the Eco systems. It causes the yield loss up to sixty percent in protected cultivation. The term Plant Nematology research is important for the research community in nematological aspects. In the impact of researches enhance the Agricultural developmental activity and as well as the economical development in the national and global level.

**Scientometrics.** It is the measurement of science and therefore concerned with the growth, structure, inter relationship and productivity of scientific disciplines. In contrast to Bibliometrics, the basis for Scientometric analysis is not limited to written communication only. There are two scientometric approaches: one is Normative another one is Descriptive, the normative perspective is to establish norms, rules and heuristics to ensure a desirable discipline progress. In contrast, the descriptive approach is to observe and report on the actual activities of the fields scholars.

Tague Sutcliffe (1992) Sutcliffe defines "scientometrics" as the study of the quantitative aspects of science as a discipline or economic activity. It is part of the sociology of science and has application to science policy-making. It involves quantitative studies of scientific activities, including, among others, publication, and so overlaps bibliometrics to some

extent. Van Raan (1997) derived the concepts of Science and technology indicators, information systems on science and technology, the interaction between science and technology, and cognitive as well as socio organizational structures in science and technology are the four interrelated areas where the core research activities of scientometries are concentrated.

**Web of Science.** The Web of Science Database spans the years 1900 to the present. Now a day the database is maintained by Clarivate Analytics. Citation indexing, author-based titles, topic-related titles, subject keywords, abstracts, journal title searches, author details, and publication year were all examined in depth. It displays the sciences, social sciences, arts, and humanities, including 256 disciplines. The format is full-text articles, reviews, editorials, abstracts, proceedings, and technical papers. There are 90 million records available in the database of scientific citation searches.

**Plant Nematology.** Plant Nematology is the scientific discipline concerned with the study of nematodes, or roundworms. Although nematological investigation dates back to the days of Aristotle or even earlier, nematology as an independent discipline has its recognizable beginnings in the mid to late 19<sup>th</sup> century. Plant Nematology in agriculture benefits and practices, in response to more bacteria, bacterial feeding nematodes also increase in abundance, and this stabilizes nitrogen availability and increases nitrogen mineralization in soil once again, which is for crop growth and soil fertility.

## LITERATURE REVIEW

Chandran (2021) carried out a study on "Mapping of Nephrology Research Performance of Global Scientists in the Science Citation Index Expanded". The data has been extracted from the Web of Science database during the period 2006–2015. The study shows that a total of 23,335 publications have been published at the global level. The average number of publications published was 2333.5, and the highest number of publications (3357) were published in 2015. It was focused on the year-wise growth of publications, the most prolific authors, highly productive institutes, highly productive countries, language-wise distributions of publications, high-productivity subject areas, and the most preferred journals for publications.

Chaman Sab *et al.* (2021) carried out a study on "Mapping of Indian Biomedicine Research: A Scientometric Analysis of Research Output During 2012–2016". It is based on the total publication output, its growth rate, the quality of papers published, and the rank of India in the global context. Patterns of international collaborative research output and the major partner institutions in India have also been discussed. This study also evaluates the research performance of different types of Indian biomedical and research foundations and the characteristics of published literature in Indian and foreign journals. It also analyses the medical research output by disease and organ.

## MATERIALS AND METHODS

The published data on biomedicine has been retrieved using the Web of Science database. It shows that the result has a total of 2712 publications; they're an insignificant growth in biomedicine literature that has been published in India. Sankar (2021) Food Microbiology research output by scientists was collected using the web of science (WoS) study results found that 2571 records were published s research out in different categories such as year wise output, source wise, topmost ranking for journals, author, institution, Countries and Keywords. Sankar and Prema (2022) studied the scientific parameters such as year-wise distribution of research productivity, most prolific authors, funding sponsors, Collaborating Institutions, Collaborating Countries and top ranked sources preferred by the agricultural faculty members for publishing their research output. Sankar and Srinivasaragavan (2012) were studied through web of Science database study analyses agriculture research publication output for the period of 1970-2012 and found the results in the topmost rank of documents and various categories.

Ponnudurai and Thilakar (2020) published "Mapping of Crop Science Research Output: A Scientometric

Analysis". The study examines Crop Science Research output from 1981 to 2010, including year-by-year distribution research growth, a relative growth rate, exponential growth, Asian Countries publications' share, citation impact, share of international collaborative papers, and major collaborative partner country patterns of research communication in most productive journals. Mouniga *et al.* (2022) investigated the experimental analysis in plant nematode research, the same type of research analysis, to learn more about their findings. Manoj Kumar (2017) examined various past research reviews in their study carried out Science & Technology research for Industry Analysis in India.

**Objectives of the Study.** The present study has been designed with the following objectives:

- To learn about the global context of Plant Nematology
- To the Distribution of Year-Wide Publications in Plant Nematology
- To the Distribution of References by Articles
- Types of Plant Nematology Research Publications
- To identify language-wise publications
- To identify research areas in plant nematology
- To identify country-wise publications in plant nematology.

**Limitations.** The present study covers the period from 2002 to 2021 in the field of plant nematology. The data were downloaded from the Web of Science database. The information was obtained from this type of database and searched by category using the key term "Plant Nematology". The plant sciences cover a period of twenty years only at the global level.

**Analysis and Interpretation.** According to the above table, the distribution of year-by-year publications in Plant Nematology totaled 3102 from 2002 to 2021, with an average publication of 155.10 per year. According to the table above, there were more publications in Plant Nematology in 2014 (270, 8.71%), followed by more publications in 2019 (234, 7.5%). The research trend line in the above table shows that Plant Nematology research has gradually increased and decreased year after year.

The total local citation score for the study period is 2849, while the total global citation score for the study period is 24850. During the study period, the average citation score for individual research in Plant Nematology was 8.01.

The Table 2 shows the distribution of references by volume. During the study period of 2002-2021, the overall distribution pattern of citations in plant nematology research literature contained 24850 cited references in 3102 articles, with each article containing an average of 8.01 articles.

**Table 1: Distribution of Year wise Publications in Plant Nematology.**

Sr. No.	Year	Count	Percentage	TGCS	LGCS
1.	2002	87	2.80	7	5
2.	2003	83	2.68	70	39
3.	2004	86	2.77	178	58
4.	2005	106	3.42	239	74
5.	2006	138	4.45	317	23
6.	2007	131	4.22	495	80
7.	2008	91	2.93	612	96
8.	2009	168	5.42	621	77
9.	2010	158	5.09	998	110
10.	2011	94	3.03	1071	141
11.	2012	165	5.32	1092	160
12.	2013	142	4.58	1202	163
13.	2014	270	8.70	1479	170
14.	2015	202	6.51	1420	189
15.	2016	206	6.64	1734	201
16.	2017	114	3.68	1941	199
17.	2018	173	5.58	2014	210
18.	2019	234	7.55	2742	227
19.	2020	215	6.93	3146	237
20.	2021	239	7.70	3472	390
<b>Total</b>		<b>3102</b>	<b>100.00</b>	<b>24850</b>	<b>2849</b>

**Table 2: Distributions of References by Articles.**

Sr. No.	Year	Articles	No. of Citations	Cumulative Percentage		Average Citation Per Article
				Percentage	Cumulative Percentage	
1.	2002	87	7	2.80	2.80	0.08
2.	2003	83	70	2.68	5.48	0.84
3.	2004	86	178	2.77	8.25	2.07
4.	2005	106	239	3.42	11.67	2.25
5.	2006	138	317	4.45	16.12	2.30
6.	2007	131	495	4.22	20.34	3.78
7.	2008	91	612	2.93	23.27	6.73
8.	2009	168	621	5.42	28.69	3.70
9.	2010	158	998	5.09	33.78	6.32
10.	2011	94	1071	3.03	36.81	11.39
11.	2012	165	1092	5.32	42.13	6.62
12.	2013	142	1202	4.58	46.71	8.46
13.	2014	270	1479	8.70	55.41	5.48
14.	2015	202	1420	6.51	61.92	7.03
15.	2016	206	1734	6.64	68.56	8.42
16.	2017	114	1941	3.68	72.24	17.03
17.	2018	173	2014	5.58	77.82	11.64
18.	2019	234	2742	7.55	85.37	11.72
19.	2020	215	3146	6.93	92.30	14.63
20.	2021	239	3472	7.70	100.00	14.53
<b>Total</b>		<b>3102</b>	<b>24850</b>	<b>100</b>		<b>8.01</b>

**Table 3: Document Types of Plant Nematology Research Publications.**

Sr. No.	Document Type	Count	Percentage	TGCS	LGCS
1.	Article	2067	66.63	18231	1735
2.	Meeting Abstract	919	29.63	4226	679
3.	Proceeding Paper	48	1.55	1021	210
4.	Review Article	37	1.19	925	103
5.	Editorial Material	14	0.45	214	65
6.	Biographical-Item	7	0.23	102	23
7.	Book Chapters	5	0.16	95	10
8.	Correction	3	0.10	16	9
9.	Book Review	1	0.03	8	7
10.	News Item	1	0.03	12	8
<b>Total</b>		<b>3102</b>	<b>100.00</b>	<b>24850</b>	<b>2849</b>

The above table shows that there were various types of publications in Plant Nematology from 2002 to 2021. Articles account for 2067 (66.63%) of the total output of 3102 publications, while abstracts account for 919 (29.63%). Proceedings Paper 48 (1.55%) and Review Article 1.19 (1.19%). It is possible to conclude that articles are at the top of the food chain, followed by other sources of publication, and that the majority of research output is published in general journals. The total local citation score for the study period is 2849, while the total global citation score for the study period is 24850.

The Table 4 revealed that the Plant Nematology

research was conducted in multiple languages. English published 3096 words (99.81%) out of 3102 words, followed by Spanish 3 (0.10%), Portuguese 2 (0.06%), and French 1 (0.03%).

The Table 5 revealed that research areas in Plant Nematology account for 3102 total counts; there are 88.915 percent of the research areas in zoology, followed by 3.127 percent of the research areas in Plant Sciences, 2.643 percent of the research areas in Entomology, 1.870 percent of the research areas in Agriculture, and 0.613 percent of the research areas in Biotechnology Applied Microbiology.

**Table 4: Language Wise Publications.**

Sr. No.	Language	Count	Percentage	TGCS	LGCS
1.	English	3096	99.81	24001	2645
2.	Spanish	3	0.10	699	134
3.	Portuguese	2	0.06	112	68
4.	French	1	0.03	38	2
<b>Total</b>		<b>3102</b>	<b>100.00</b>	<b>24850</b>	<b>2849</b>

**Table 5: Research Areas in Plant Nematology.**

Sr. No.	Research Areas	Count	Percentage
1.	Zoology	2758	88.915
2.	Plant Sciences	97	3.127
3.	Entomology	82	2.643
4.	Agriculture	58	1.870
5.	Biotechnology Applied Microbiology	19	0.613
6.	Environmental Sciences Ecology	17	0.548
7.	Biochemistry Molecular Biology	10	0.322
8.	Microbiology	10	0.322
9.	Science Technology Other Topics	9	0.290
10.	Genetics Heredity	7	0.226
11.	Life Sciences Biomedicine Other Topics	4	0.129
12.	Parasitology	4	0.129
13.	Chemistry	3	0.097
14.	Evolutionary Biology	3	0.097
15.	Forestry	3	0.097
16.	Marine Freshwater Biology	3	0.097
17.	Veterinary Sciences	3	0.097
18.	Food Science Technology	2	0.064
19.	Immunology	2	0.064
20.	Mycology	2	0.064
21.	Physiology	2	0.064
22.	Biodiversity Conservation	1	0.032
23.	Computer Science	1	0.032
24.	Infectious Diseases	1	0.032
25.	Instruments Instrumentation	1	0.032
<b>Total</b>		<b>3102</b>	<b>100.00</b>

**Table 6: Country wise publication in Plant Nematology.**

Sr. No.	Country wise Publication	Count	Percentage
1.	USA	667	21.50
2.	Peoples R China	185	5.96
3.	Iran	126	4.06
4.	Belgium	112	3.61
5.	Germany	100	3.22
6.	Spain	98	3.16
7.	South Africa	96	3.09
8.	Brazil	94	3.03
9.	England	93	3.00
10.	Russia	92	2.97
11.	Netherlands	90	2.90

12.	Turkey	77	2.48
13.	France	69	2.22
14.	Japan	67	2.16
15.	India	65	2.10
16.	Italy	65	2.10
17.	Canada	62	2.00
18.	Egypt	58	1.87
19.	South Korea	58	1.87
20.	Australia	57	1.84
21.	Scotland	50	1.61
22.	Vietnam	43	1.39
23.	Poland	34	1.10
24.	Kenya	32	1.03
25.	Mexico	31	1.00
26.	Philippines	28	0.90
27.	New Zealand	27	0.87
28.	Greece	25	0.81
29.	Israel	25	0.81
30.	Portugal	25	0.81
31.	Ireland	24	0.77
32.	Colombia	23	0.74
33.	Uganda	23	0.74
34.	Costa Rica	21	0.68
35.	Nigeria	20	0.64
36.	Pakistan	19	0.61
37.	Taiwan	18	0.58
38.	Switzerland	16	0.52
39.	Czech Republic	14	0.46
40.	Austria	13	0.42
41.	Romania	13	0.42
42.	Argentina	11	0.35
43.	Bulgaria	11	0.35
44.	Ethiopia	11	0.35
45.	Slovenia	11	0.35
46.	Morocco	10	0.32
47.	Tanzania	10	0.32
48.	Myanmar	8	0.26
49.	Serbia	8	0.26
50.	Slovakia	8	0.26
51.	Chile	7	0.23
52.	North Ireland	7	0.23
53.	Peru	7	0.23
54.	Saudi Arabia	7	0.23
55.	Sweden	7	0.23
56.	Norway	6	0.19
57.	Thailand	6	0.19
58.	Venezuela	6	0.19
59.	Cuba	5	0.17
60.	Hungary	5	0.17
61.	Senegal	5	0.17
62.	Syria	5	0.17
63.	Ukraine	5	0.17
64.	Croatia	4	0.13
65.	Ghana	4	0.13
66.	Indonesia	4	0.13
67.	Rwanda	4	0.13
68.	Uruguay	4	0.13
69.	Bolivia	3	0.10
70.	Ecuador	3	0.10
71.	Finland	3	0.10
72.	Jordan	3	0.10
73.	Lithuania	3	0.10
74.	Nepal	3	0.10
75.	Paraguay	3	0.10
76.	Zimbabwe	3	0.10
77.	Azerbaijan	2	0.06
78.	Bangladesh	2	0.06
79.	Benin	2	0.06
80.	Cambodia	2	0.06
81.	Cameroon	2	0.06
82.	Denmark	2	0.06

83.	Estonia	2	0.06
84.	Georgia	2	0.06
85.	Iraq	2	0.06
86.	Malawi	2	0.06
87.	Mozambique	2	0.06
88.	Serbia Monteneg	2	0.06
89.	Wales	2	0.06
90.	Algeria	1	0.03
91.	Bosnia Herceg	1	0.03
92.	Burkina Faso	1	0.03
93.	Cote Ivoire	1	0.03
94.	Cyprus	1	0.03
95.	Guatemala	1	0.03
96.	Honduras	1	0.03
97.	Kyrgyzstan	1	0.03
98.	Lebanon	1	0.03
99.	Libya	1	0.03
100.	Madagascar	1	0.03
	<b>Total</b>	<b>3102</b>	<b>100.00</b>

According to the Table 6, the United States contributed significantly to this research in Plant Nematology, scoring 667 counts with a percent of 21.50 in first place, followed by the People's Republic of China, which contributed 185 counts with a percent of 8. The 5.96 in second place. India has contributed 65 entries, for a percent of 2.10 in the fifteenth place.

## CONCLUSION

It is also found in the year-wise analysis, which shows increasing and decreasing trends during the study period of Plant Nematology Research publications. The Scientometrics study on plant nematology and characteristics has been found to be extremely useful in understanding communication and knowledge patterns within the field study's chosen field. These cover many great scientific discoveries and technological achievements in several fields, including vast areas of agriculture and plant nematology. It's also useful for the organisation of research and development work.

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