

Global Research output and Growth Rate in Plant Science: Scientometric Study during 2004 to 2018

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Abstract

The present study investigates on the Global Research output and Growth Rate in Plant Science: Scientometric Study during 2004 to 2018. The data were extracted from the Web of Science Database in the period 15 years only. The study reveals that the period of 15 years (2004 - 2018) with 1261 articles published. In 2018, highest publications 194 (15.38%) and the lowest publication 28 (2.22%) were published in 2004. Most of the publications have Journal article with 793 records, The Relative growth rate value (0.73) is the highest for the year 2005 and the lowest (0.17) for the year 2018. Whereas, the value of doubling time is the highest (4.96) for the year 2014 and the lowest (0.95) for the year 2014. An Author "Rafieian- Kopaei, M" published the highest number of articles 11 (0.87%), Plant Science Area has 203 (16.09%) Publications, Country United States have contributed 279 (22.12%) research publications.

Keyword

Scientometric Study, Plant Science, Webs of Science Database, Relative growth rate and Doubling Time.

Introduction

Plant science is a very important field in Agriculture field. It is very important and various types of Plants that is seeding plant, breeding and genetic plant, medicinal plant, Aromatic plant. It includes plant biology with emphasis in the broad areas of genomics, proteomics, biochemistry (including enzymology), physiology, cell biology, development, genetics, functional plant breeding, systems biology and the interaction of plants with the environment. Plant Science ranges from developing molecular techniques for genetic engineering to ecological research in the field of plant science. Ultimately the natural products wants to contribute the fundamental knowledge of basic biological processes related to development and health and the sustainable production of more healthy foods, flowers and high-value bio-based products.

Objective Study

The objectives of the study are as below:

- 1) An analyze the Year wise publication
- 2) To examine the Documents
- 3) To find the country wise Collaboration.
- 4) To identify the ranking of Author and
- 5) To find out Growth rate, and doubling time.

Methodology

The Present Study aims at analyzing the research output of researchers in the field of Plant science research. The data's were collected from web of science database. Totally 1,261 articles on Plant science research were found from above data based during 2004-2018.

Review of literature:

Murugan (2019) published an article on 'Eye Disease' Research Output during 2009-2018: Scientometric Study the recent years as using scientometric analysis for determining scientific trends in journal collaboration and growth. The present study has collected the data were PubMed database using the Keyword search an Eye disease from 2009 to 2018. It is found that the total number of 165,083 records are eye diseases during 2009 to 2018. The most of the accurate records are found in 2015, 19264(11.66%), the Female, 42466 (61.23%) is more, an article types publication of rare eye diseases are naturally majority of the case reports and Classical Articles are same category (49.27%), totally 9,717 documents are exposed in the journal category, In 2014, 5350 (12.04%) are top most level of Species - Human and majority of the records are scientifically derived from an AIDS 28469 (97.38%). The present study has in common an eye disease. It is more number of records is found in more number of females, year reasonable an article type's publication of eye diseases are majority of the case reports and Classical Articles are in the study

Selvi and Gopalakrishnan (2017) published on "Global Research Output on Crystallography: A Scientometric Study." The study reveals on the data were downloaded from the multi discipline citation database 'Scopus' and there were 2,00,598 records contributed worldwide, over a period of 44 years from 1970-2013. Bibliometrics techniques such as year wise distribution, bibliographic form of the records, area and sub field of research, source titles and research organizations were studied. Among them, 60,181 (30.00%) publications were contributed by USA, and it holds first place. India holds 7th place with 8,143 (4.06%) publications.

Ponnudurai and Thilakar (2013) carried out a study on "Mapping of Crop Science Research Output: A scientometric Analysis ". The study analyses the research output in Crop Science Research out during the period 1981-2010 and the analyses included year wise distribution research growth, relative growth rate, exponential growth, Asian Countries publications share, citation impact, share of international collaborative papers and major collaborative partner countries patterns of research communication in most productive journals.

Results and Analyze

Year wise Plant Science Publication

The results to analyze the year - wise publication of research on Plant Science, the data have been presented in Table-1. From the below table, Out of 1261 records, we could see the highest publications 194 (15.38%) publications were published in 2018. The lowest publications 28 (2.22%) were published in 2004 and the figure one represents the year wise Plant Science Publications.

Table 1. Year wise Distribution of Plant Science Publication

S. No	Year	Number of Publications	Percentage
1	2004	28	2.22%
2	2005	30	2.37%
3	2006	33	2.61%
4	2007	31	2.45%
5	2008	42	3.33%
6	2009	80	6.34%
7	2010	50	3.96%
8	2011	59	4.67%
9	2012	74	5.86%
10	2013	80	6.34%
11	2014	76	6.02%

12	2015	126	9.99%
13	2016	177	14.03%
14	2017	181	14.35%
15	2018	194	15.38%

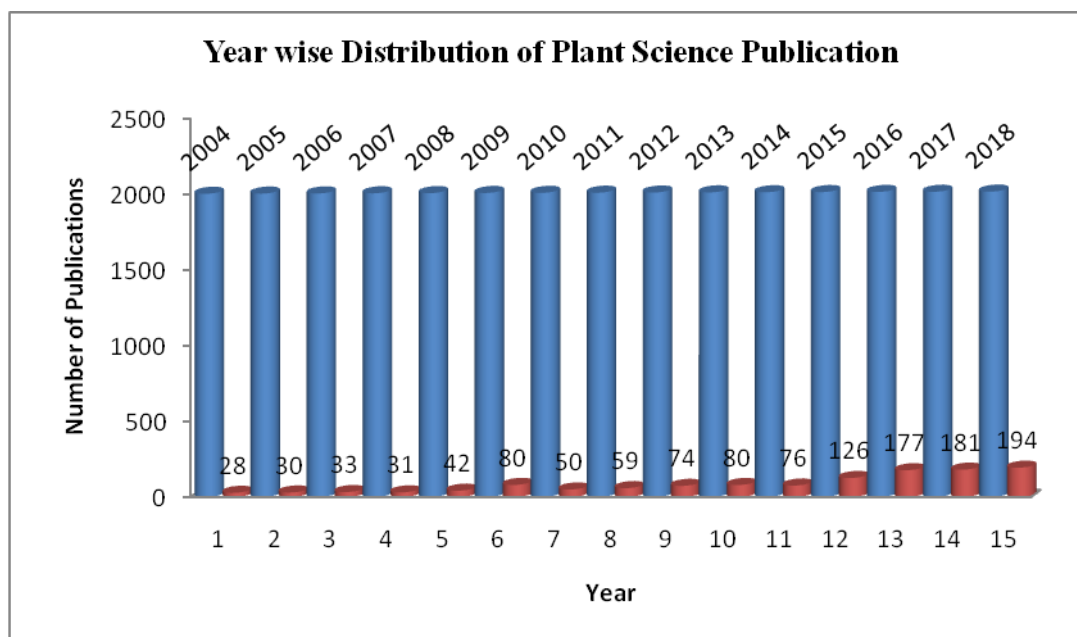


Figure.1

Document Type

The Document wise shows the table 2 among the nine documents types, most of the Research in Articles 793 (63%) followed by while Review 389 (30.80%) Editorial material comprises 32 (2.52%) and Proceedings paper comprises 30 (2.37%). Approximately three records are found in the Book Chapter 7 (0.55%) and Data paper comprises 5 (0.39%). Three records are average of Biographical item 3 (0.23%), Reprint comprises and Retracted publication 1 (0.23%) are same level.

Table 2. Document Type

S. No	Document Types	Number of Document	Percentage
1	Article	793	63.00
2	Review	389	30.80
3	Editorial Material	32	2.52
4	Proceeding during paper	30	2.37
5	Book Chapter	7	0.55
6	Data paper	5	0.39
7	Biographical item	3	0.23
8	Reprint	1	0.07
9	Retracted publication	1	0.07

Relative growth rate

The relative Growth rate and Doubling Time model was developed by Mahapatra and applied to examined the relative Growth Rate of research publications. The relative Growth rate is increased in the number of publications or pages per unit of time and can be calculated from the following equations.

$$= R(1-2) \quad W2_W1/T2-T1$$

Where, $R(1-2)$ is mean Relative Growth Rate over the specified period

$W1 = \text{Log } W1$: (Natural log of initial number of publications/pages)

$W2 = \text{Log } W2$: (Natural log of final number of publications/pages)

$T2-T1$ = The Unit difference between the Initial time and Final time

The relative Growth rate for both publications and pages can be calculated separately.

Therefore,

$R_{(a)}$ = Relative growth rate per unit of time (Year)

$R_{(p)}$ = Relative growth rate per unit of pages, per unit of time

Doubling Time

From the calculation, it is found that there is a direct equivalence existing between the relative Growth rates and Doubling time. If the number of publications/pages of a subject doubles during the given period, then the difference between the logarithm of the numbers at the beginning and at the end of the period must be the logarithms of the number two. If one uses a natural logarithm, this difference has a value of 0.693. The corresponding doubling time for publications and pages can be calculated by using the following formula:

Relative growth rate and Doubling Time of the Plant Research

It is evident from the table 4 presents the year wise Relative Growth Rate and Doubling time of publications. It is conclude from the table that RGR has been decreasing from 0.73 in the year 2005 to 0.17 for the year 2018. In the value of Doubling time (Dt) goes on increasing from 0.95 in the year 2005 to 4.96 for the year 2014. The RGR value (0.73) is the highest for the year 2005 and the lowest (0.17) for the year 2018. Whereas, value of Dt is the highest (4.96) for the year 2014 and the lowest (0.95) for the year 2005. Hence, the inference can be derived from the table that RGR and Dt are inversely proportional to one another.

Table-3: Relative growth rate and doubling time for publications

Year	Recs	Cumulative	w1	w2	R(a)	Mean (a) 1-2	Doubling time	Mean pt (a) 1-2
2004	28	28		3.33				
2005	30	58	3.33	4.06	0.73		0.95	
2006	33	91	4.06	4.51	0.45		1.54	
2007	31	122	4.51	4.80	0.29		2.36	
2008	42	164	4.80	5.10	0.30	0.35	2.34	1.44
2009	80	244	5.10	5.50	0.40		1.74	
2010	50	294	5.50	5.68	0.19		3.72	
2011	59	353	5.68	5.87	0.18		3.79	
2012	74	427	5.87	6.06	0.19		3.64	
2013	80	507	6.06	6.23	0.17	0.23	4.04	3.39
2014	76	583	6.23	6.37	0.14		4.96	

2015	126	709	6.37	6.56	0.20		3.54	
2016	177	886	6.56	6.79	0.22		3.11	
2017	181	1067	6.79	6.97	0.19		3.73	
2018	194	1261	6.97	7.14	0.17	0.18	4.15	3.90

Ranking of Authors based on Publications

The above table 4 is shows that the ranking of most number of authors based on publications. An author "Rafieian-Kopaei M" Published the highest number of articles with 11 (0.87%) occupied the first rank, out of 10 authors, six belongs Li, J .5(0.39%), Pandey,M.M., Quintans, LJ., Rastogi, S., Rawat, AKS and Zhang, Y.5(0.39%) and three authors contributed Asadi-samani,M. Bamani,M and Chao,W. 4(0.31%).

Table. 4 Ranking of Authors based on publications

Author	Publication	% of 1261	Rank
Rafieian-kopaei M	11	0.87	1
Li J	5	0.39	2
Pandey MM	5	0.39	3
Quintans LJ	5	0.39	4
Rastogi S	5	0.39	5
Rawat AKS	5	0.39	6
Zhang Y	5	0.39	7
Asadi-Samani M	4	0.31	8
Bhamani M	4	0.31	9
Chao W	4	0.31	10

Research Areas of the Plant Science

Data presented in the table 5 shows that top ten Research areas output in Plant Science. Out of 1261, most of the Plant science Research Area, 203(16.09%), followed by Agriculture, 146(11.57%), Pharmacology and Pharmacy, 141(11.8%), Environmental Science Ecology, 137 (10.86%), Life science Biomedicine other topic, 100 (7.93%), Science Technology,95 (7.53%), Integrative complementary Medicine, 73(5.78%), Chemistry, 72 (5.70%), Biochemistry molecular Biology, 61(4.83%) and Engineering, 57(4.52%).

Table: 5 Top 10 Research Areas in Plant Science

S. No	Research Area	Article	Percentage
1	Plant Science	203	16.09
2	Agriculture	146	11.57
3	Pharmacology and Pharmacy	141	11.18
4	Environmental Science Ecology	137	10.86
5	Life Science Biomedicine other topic	100	7.93
6	Science Technology	95	7.53
7	Integrative complementary Medicine	73	5.78
8	Chemistry	72	5.70
9	Biochemistry molecular Biology	61	4.83
10	Engineering	57	4.52

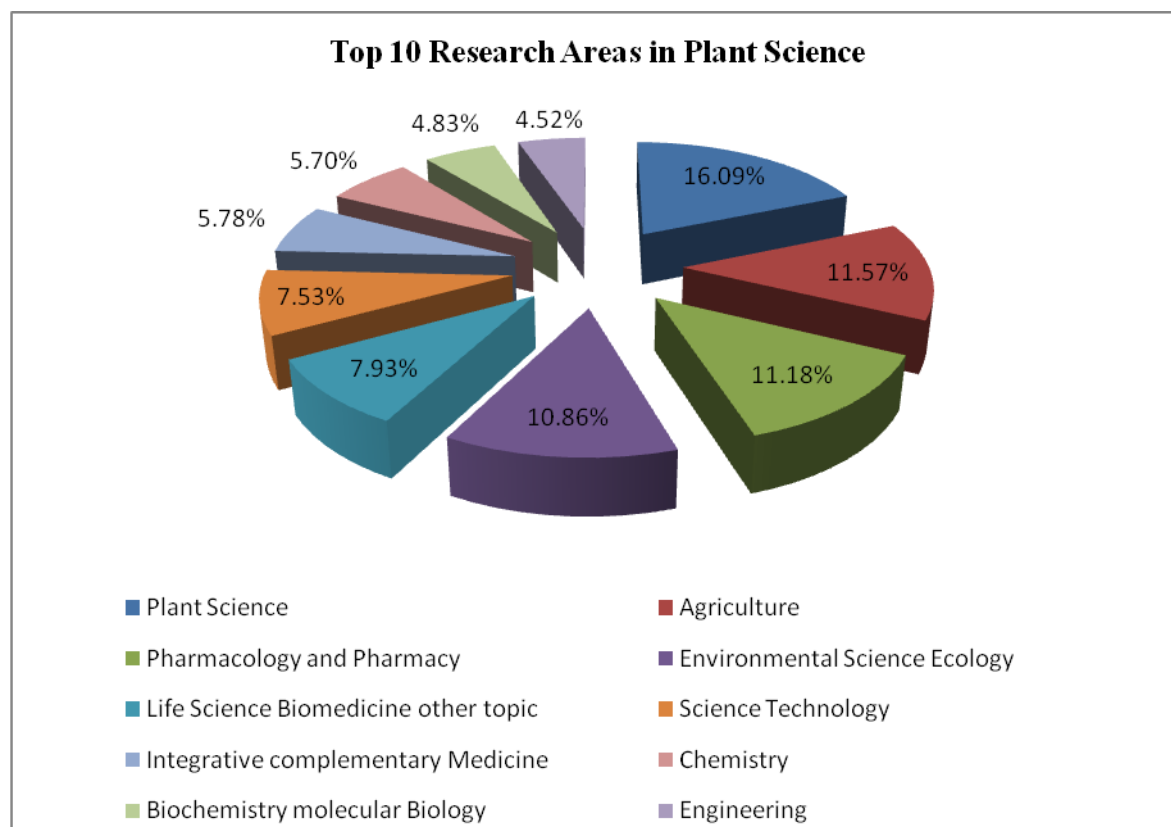


Figure.2

Country wise research production

The countries are national and International level various research output produced in the plant science research. Table 6 indicates that top ten Countries in Plant Science Research. Out of 1261, the top most a United State was published 279(22.12%) followed by France, 113 (8.96%), England, 100(7.93%) and People R China, 100 (7.93%). An India, 77(6.10%) Publications, Brazil, 72(5.70%), Germany, 72 (5.70%), Iran, 69(5.47%), Canada, 63(4.99%) and Australia, 55(4.36%) has lowest published and figure 2 indicates that the Country wise research production.

Table: 6 Top 10 Countries in the research of Plant Science

S. No	Country	Article	Percentage
1	United State	279	22.12
2	France	113	8.96
3	England	100	7.93
4	Peoples R China	100	7.93
5	India	77	6.10
6	Brazil	72	5.70
7	Germany	72	5.70
8	Iran	69	5.47
9	Canada	63	4.99
10	Australia	55	4.36

Conclusion

From the study, explained the Global Research output and Growth Rate in Plant Science: Scientometric Study during 2004 to 2018. The study analyzed in the year, Document Type, most of the authors are rank wise, top ten Research areas and country. The data collected from the Web of Science database. Totally 1261 documents are retrieved from 2004 to 2018. It is concluded from the table that RGR has been decreasing from

0.73 in the year 2005 to 0.17 for the year 2018. In the value of Doubling time goes on increasing from 0.95 in the year 2005 to 0.17 for the year 2018.

References

- Gautam, V. & Mishra, R. (2016) .Scholarly trends of LIS research in India: a scientometrics study based on web of science during the period of 2005-2014. e - Library Science Research Journal, 5 (5), 1-13.
- Lariviere. V, Gingras, Y and Archambault, E. (2006). Canadian collaboration networks: A comparative analysis of the natural sciences, social sciences and the humanities. *Scientometrics*, 68(3), 519-533.
- Leydesdorff. L and Sun, Y. (2009). National and international dimensions of the Triple Helix in Japan: University-industry-government versus international co-authorship relations. *Journal of the American Society for Information Science & Technology*, 60(4), 778-788.
- Kalidha. A & Suresh (2017) Global Research Output and Growth Rate study on “Swine Flu (Influenza): A Study 2007-2016.
- Murugan.K. (2019).An ‘Eye Disease’ Research Output during 2009-2018: Scientometric Study. *Journal of Advances in Library and Information Science*, Vol. 8. No.1, pp.21-24
- Selvi. M. G and Gopalakrishnan. S. (2017). Global Research Output on Crystallography: A Scientometric Study. *International Journal of Library Science and Research* Vol. 7, Issue 3, Jun 2017, 19-32

