Original Research Article

Comparative Analysis of Research output of Tamil Nadu Agricultural University as reflected in Scopus and Web of Science

Abstract

The study presented in the paper has analyzed the research productivity of faculty members of Tamil Nadu Agricultural University for the period of 2001-2020. Total of 4372 publications in Scopus and 1980 publications in web of Science database were retrieved and compared the performance of the faculty members. This study analyzed 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. Tamilnadu Agricultural University faculty members published more publications in Scopus 4372 compared to Web of Science 1980. Articles are the predominant publications by the faculty members of Tamilnadu Agricultural University, Coimbatore 3928 in Scopus and 1822 in Web of Science Prof. Samiyappan R is the predominant and most impactful author of Tamilnadu Agricultural University.USA is the most predominant country collaborated with Tamilnadu Agricultural University publications about 187 in Scopus and 137 in Web of Science Legume Research is the most predominant journal with 69 publications in Web of Science and Electronic Journal of Plant Breeding 448 publications in Scopus. Agricultural College and Research Institute, Madurai is the most collaborating institution with 538 publications in Scopus and Kansas State University in Web of Science database.Plant Sciences (499), Agronomy (490), Biotechnology Applied Microbiology (190), Horticulture (159) and Environmental Science (129) are the predominant subject areas focused by the faculty members of Tamilnadu Agricultural University in Web of Science and Agricultural and Biological Sciences subject category in Scopus 3317 publications. Indian Council of Agricultural Research is the predominant sponsor and supported for 104 research publications followed by Department of Biotechnology, Ministry of Science and Technology, India

Keywords: Agriculture, Tamil Nadu Agricultural University, Research Productivity, Scientometrics

Introduction

India is an agrarian country, and agriculture makes up a significant portion of the Indian economy, accounting for over 18% of GDP. The agriculture sector in India employs over 52 percent of the country's workforce. Only because of the diligent and serious study conducted by Indian agricultural specialists was the Green Revolution possible in India. Pandit Jawaharlal Nehru, India's previous Prime Minister, emphasised the necessity of agricultural research by saying, "Everything can wait, but agriculture cannot." In India, agricultural research is critical to the country's progress. Scientific research evaluation is a complicated process that can be simplified by utilising bibliometric indicators that are based on the estimation of scientific output, which implicitly signals productivity. For decades, publication counting has been used to assess the effectiveness of research. However, the method's main restriction is that it can only track research efforts that result in written knowledge that is disseminated through established communication channels such as journals, books, and patents. Despite the method's limitations, it was thought worthwhile to investigate the nature and other distinguishing elements of scientific study in Tamil Nadu, as demonstrated by scientific publications.

Tamil Nadu Agricultural University

Agriculture is one of the important subject in the Science and the education is professional based .There are sixty three State Agricultural Universities (SAUs) available in India to offer various undergraduate and post graduate degree programmes related to agriculture. Tamil Nadu Agricultural University is one of top ranking SAUs in India by introducing innovative ideas in teaching and research. Tamil Nadu Agricultural University (TNAU) began in 1868 by founding an Agricultural School in Saidapet, Madras, Tamil Nadu later shifted to Coimbatore. It was connected with Madras University in 1920. TNAU have responsibility to provide the agricultural education and research and research products to the State Agricultural Department. The Agricultural College and Research Institute, Coimbatore, was the only Agricultural Education Institute in South India till 1946. It was designated as a Post-graduate Centre for Master's and Doctoral degrees in 1958. Agricultural College and Research Institute, Madurai, was founded in 1965. However, the TNAU was founded in 1971, and these two colleges comprised the nucleus. Presently, The University has 17

constituent colleges, 4 Regional research stations, 22 Agricultural research stations ,13 Horticultural research stations and 14 Krishi Vigyan Kendra (KVKs).The university mandates for each of the Station, Departments, Colleges and directorate charted.

Web of Science

Clarivate Analytics' Web of Science is an online database and Clarivate Analytics' offering. This database is one of the information abstracting and citation databases. In general, indices for measuring research output include the number of citations, the h index, and Total Global Citations Scores (TGCS) and Total Local Citations Scores (TLCS). Hiscite programme was used to get these parameters. It covers a wide range of topics and gives data based on more certified materials provided by researchers.

Scopus

Scopus is a product of Elsevier, which was founded in 2004. Elsevier Publishing Group maintains the Scopus database, which is an abstracting and citations information portal. Scopus collects and distributes data based on more validated papers published by the researcher. Scopus, in other words, relies on peer-reviewed, high-impact-factor journals, books, conference proceedings, and other sources. Scopus gives information about the researcher's h-Index, CiteScore, and SJR.

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Review of Literature

Scopus based Researches

Arumugam & Balasubramani (2020) were research carried out a quantitative and qualitative study of Kumaraguru College of Technology, Coimbatore's publication output. For the years 1997 through 2020, data was gathered from the Scopus database. The largest numbers of 404 papers were published in 2018 and 2019 among the 2110 papers published over a 24-year period. Between 2011 and 2020, 1792 papers were published, accounting for 85.3 percent of the total. With 1665 papers, journals are the most popular mode of publication. This research shows that Kumaraguru College of Technology has made significant contributions to research in Science, Engineering, and Technology, and that faculty publication output has increased significantly in recent years.

Geetha, N & Kothainayaki, S (2019) measured research output of Anna University using Scopus database and the top most was given for Type of Source, Chronological growth, Subject wise contribution, Document type preferred, Collaborated Country, Collaborated Institutions, Contributed Journal, Highly contributed author, Keywords Preferred and Language of the paper. A total of 23,883 records have been identified and the same has been analyzed.

Susan, M. K., Sheeja, N.K. & Cherukodan, S (2018) analyzed the research output of Tamil Nadu universities top most ranking wise prolific authors, publications, countries and citations etc. Only 40 universities analyzed out of a total 52. The First rank position in Anna University is the top ranking university in the state with 17859 documents, Second Rank Vellore Institute of Technology (VIT) with 10646 and third rank for University of Madras with 10474. The top three universities in Tamil Nadu come under the first top 30 institutions having more documents in Scopus from India.

Institutional Based Researches

Sankar, M (2020) used Web of Sciences to examine plant science research output at Tamil Nadu Agricultural University from 2000 to 2020. He reported that the TNAU scientist's research output was in the form of research papers in 2015, with the maximum number of publications output 49. (83.01%). Plant Archives was the most popular journal for submissions, accounting for 30 papers. Samiyappan R was the most prolific author, publishing 45 articles in various publications. 28 essays were written in partnership with Kansas State University. Rice was the most commonly used keyword in the plant science category (97 times).

Jayaprakash G Hugar (2019) has found the results in their study in the Web of Science Database for publication pattern, trend, and collaboration with different organizations, institutions and different nations. Top most funding agency of Goa University in last ten years. Totally 1218 articles including 497 international collaborated articles with an increasing growth rate during the study period.

Anil Kumar Siwach & Seema Parmar (2018) analyzed Research Contributions of CCS Haryana Agricultural University during the year from 2001 to 2015 The result based on the year-wise research output, subjects ,national and Global contributions , top most publications of journals, most productive authors,top most using keywords, authorship , citations pattern and highly cited paper. A total of 2649 paper were published during the research period and 15282 citations.

Susan, M. K., Sheeja, N.K. & Cherukodan, S (2018) analyzed the research output of Tamil Nadu universities top most ranking wise prolific authors, publications, countries and citations etc. Only 40 universities analyzed out of a total 52. The First rank position in Anna University is the top ranking university in the state with 17859 documents, Second Rank Vellore Institute of Technology (VIT) with 10646 and third rank for University of Madras with 10474. The top three universities in Tamil Nadu come under the first top 30 institutions having more documents in Scopus from India.

Objectives of the Study

The primary objective of the study is to analyse the scientific research publications by the faculty members of Tamilnadu Agricultural University, Coimbatore for the period of 2001-2020 as reflected in both Scopus and Web of Science.

- To analyze the growth pattern of Tamilnadu Agricultural University as reflected in the Scopus and web of Science for the period 2001- 2020.
- To explore the document wise output of Tamil Nadu Agricultural University in Scopus and Web of Science database
- To understand Subject wise Research output of Tamil Nadu Agricultural University in Scopus and Web of Science database
- To find out the predominant institutions collaborated with Tamil Nadu Agricultural University in Scopus and Web of Science database
- To figure out the Sponsorship wise research output of Tamil Nadu Agricultural University
- To explain the Country wise research output of Tamil Nadu Agricultural University in Scopus and Web of Science database
- To analyze the Author wise in research output Tamil Nadu Agricultural University in Scopus and Web of Science database

- To understand the Source wise research output of Tamil Nadu Agricultural University in Scopus and Web of Science database

Scope and Limitations

The present study is limited to the 6352 research publications of Tamilnadu Agricultural University, Coimbatore in Tamilnadu Only. The study is limited to the publications from 2001 to 2020 which are reflected in Scopus and Web of Science Only.

Methodology

The Scopus and Web of Science citation databases are used as a data collection tool and extracted 4372 records in Scopus and 1980 records in Web of Science as on 30 March 2022 for the period of 2001 to 2020 with the search string "Tamilnadu Agricultural University". The extracted data were Histcites analyzed using Biblioshiny and VoS viewer and a comparative analysis were done with respective of the institution.

Data Analysis and Interpretation

Table.1 Year wise research output and Annual Growth rate of Tamil Nadu Agricultural University in Scopus and Web of Science Databases

Sl. No	Publication Year	Scopus Publications	Annual Growth rate	Web of Science Publications	Annual Growth rate
1	2001	122	-	50	-
2	2002	92	-24.59	57	14.00
3	2003	114	23.91	59	3.51
4	2004	118	3.51	71	20.34
5	2005	107	-9.32	45	36.62
6	2006	134	25.23	57	26.67
7	2007	172	28.36	99	73.68
8	2008	164	-4.65	112	13.13
9	2009	193	17.68	99	11.61
10	2010	221	14.51	91	8.08

11	2011	180	-18.55	100	9.89
12	2012	195	8.33	81	19.00
13	2013	233	19.49	94	16.05
14	2014	285	22.32	119	26.60
15	2015	294	3.16	124	4.20
16	2016	304	3.40	140	12.90
17	2017	322	5.92	137	2.14
18	2018	292	-9.32	125	8.76
19	2019	396	35.62	125	0.00
20	2020	434	9.60	169	35.20
	Total	**4372**		**1980**	

Table 1 shows the year wise research output of Tamilnadu Agricultural University as reflected in both Scopus and Web of Science database for the period of 2001-2020. It is clear evident that the researchers of TNAU published more publications in Scopus 4372 compared to Web of Science 1980.During 2001 -2010 there is an accountable publications with the annual growth rate in Scopus database ranges from 23.91 to 14.51, in the last decade there is a decreasing trend of AGR value from 22.32 to 9.60. Compared to Web of Science database the university has published total of 1980 publications and the annual growth rate ranges from 14 to 35.2. In the recent years there are good numbers of publications traced in the Web of Science database.

Document Wise Distribution

Figure 1 shows the document wise distribution of research output of Tamilnadu Agricultural University as reflected in both Scopus and Web of Science database for the period of 2001-2020. It is clear that Articles are the predominant publications by the faculty members of Tamilnadu Agricultural University, Coimbatore 3928 in Scopus and 1822 in Web of Science respectively.

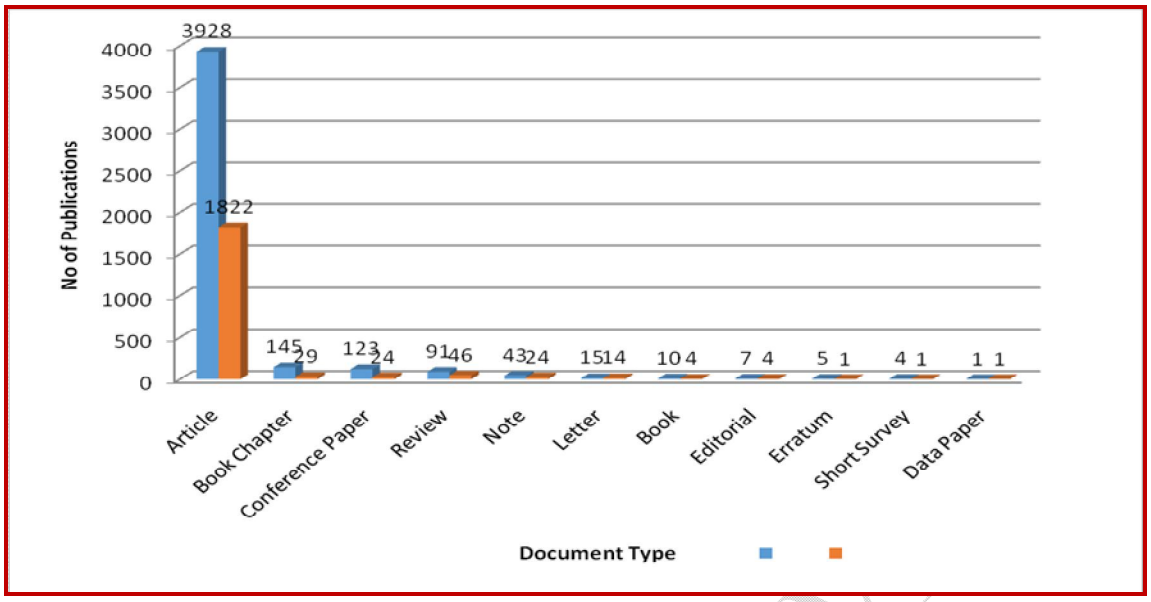


Figure 1: Document Type Distribution of Tamilnadu Agricultural University

Table.2. Document wise output of Tamil Nadu Agricultural University in Scopus and Web of Science Database

Sl. No	Document Type	Scopus	Percent (%)	WoS	Percent (%)
1	Article	3928	89.84	1822	92.0
2	Book Chapter	145	3.32	29	2.3
3	Conference Paper	123	2.81	24	1.5
4	Review	91	2.08	46	1.5
5	Note	43	0.98	24	1.2
6	Letter	15	0.34	14	0.7
7	Book	10	0.23	4	0.3
8	Editorial	7	0.16	4	0.2
9	Erratum	5	0.11	1	0.2
10	Short Survey	4	0.09	1	0.1
11	Data Paper	1	0.02	1	0.1
	Total	**4372**	**100**	**1980**	**100**

Table 2 depicts that there are various type of publications are contributed by the faculty members of Tamilnadu Agricultural University such as Article, Conference paper, Book Chapter, Reviews, Notes, Letter, Book, Editorial, erratum, short survey and data paper in which Articles are the predominant source of publications in both Scopus and web of Science by the faculties of the University 89.84 and 92% respectively.

Table.3. Subject wise Research output of Tamil Nadu Agricultural University in Scopus database

Sl. No	Subjects	Documents
1	Agricultural and Biological Sciences	3317
2	Biochemistry, Genetics and Molecular Biology	769
3	Environmental Science	528
4	Immunology and Microbiology	331
5	Engineering	297
6	Medicine	145
7	Chemical Engineering	140
8	Multidisciplinary	124
9	Earth and Planetary Sciences	118
10	Chemistry	117
11	Pharmacology, Toxicology and Pharmaceutics	106
12	Social Sciences	100
13	Energy	65
14	Materials Science	45
15	Economics, Econometrics and Finance	40
16	Computer Science	39
17	Veterinary	39
18	Business, Management and Accounting	31
19	Physics and Astronomy	29
20	Mathematics	25
21	Health Professions	14
22	Nursing	12

23	Neuroscience	8
24	Decision Sciences	7
25	Arts and Humanities	2

Table 3 shows the Top 25 predominant subject categories focussed by the faculty members of Tamilnadu Agricultural University, Coimbatore in Scopus Database. Since It is an Agricultural University their focus is more on Agricultural and Biological Sciences subject category in Scopus 3317 publications followed by Biochemistry, Genetics and Molecular Biology, 769 and Environmental Science 528 publications.

Table.4. Subject wise Research output of Tamil Nadu Agricultural University in Web of Science Database

Sl. No	Subjects	Documents
1.	Plant Sciences	499
2.	Agronomy	490
3.	Biotechnology Applied Microbiology	190
4.	Horticulture	159
5.	Environmental Sciences	129
6.	Food Science Technology	116
7.	Agriculture Multidisciplinary	113
8.	Entomology	110
9.	Microbiology	104
10.	Agricultural Engineering	103
11.	Multidisciplinary Sciences	74
12.	Soil Science	70
13.	Biochemistry Molecular Biology	67
14.	Genetics Heredity	63
15.	Meteorology Atmospheric Sciences	36
16.	Engineering Chemical	31
17.	Ecology	29
18.	Water Resources	28
19.	Chemistry Analytical	27
20.	Chemistry Applied	27

21.	Energy Fuels	23
22.	Toxicology	23
23.	Chemistry Medicinal	21
24.	Engineering Environmental	21
25.	Nutrition Dietetics	21

Table 4 shows the Top 25 predominant subject categories focussed by the faculty members of Tamilnadu Agricultural University, Coimbatore in Web of Science Database. Plant Sciences (499), Agronomy (490), Biotechnology Applied Microbiology (190), Horticulture (159) and Environmental Science (129) are the predominant subject areas focused by the faculty members.

Table.5. Collaboration of Institution wise in research output Tamil Nadu Agricultural University in Scopus database

Sl. No	Institution Name	Documents
1.	Tamil Nadu Agricultural University	4168
2.	Agricultural College and Research Institute, Madurai	538
3.	Indian Council of Agricultural Research	128
4.	ICAR - Sugarcane Breeding Institute, Coimbatore	84
5.	ICAR - Indian Agricultural Research Institute, New Delhi	80
6.	International Crops Research Institute for the Semi-Arid Tropics	73
7.	Ministry of Environment & Forests, Government of India	71
8.	Anbil Dharmalingam Agricultural College and Research Institute	68
9.	Rajasthan Agricultural University, Agricultural Research Station	65
10.	Kansas State University	59

Table 5 shows the Top 10 predominant collaborating institutions with the Tamilnadu Agricultural University, Coimbatore as reflected in Scopus Database. Agricultural College and Research Institute, Madurai is the most collaborating institution with 538 publications

followed by Indian Council of Agricultural Research (128) and ICAR - Sugarcane Breeding Institute, Coimbatore (84) publications. It is clear that most of the publications are collaborated with agricultural institutions in the Tamilnadu region.

Table.6. Collaboration of Institution wise in research output Tamil Nadu Agricultural University in Web of Science Database

S. No	Institution	Recs	Percent	TLCS	TGCS
1	Tamil Nadu AgrUniv	1776	89.7	1183	28113
2	TNAU	77	3.9	22	1041
3	Kansas State Univ	50	2.5	78	1335
4	Int Crops Res Inst Semi Arid Trop	49	2.5	32	943
5	Indian Council Agr Res	43	2.2	50	1203
6	Int Rice Res Inst	35	1.8	50	1525
7	Chungbuk NatlUniv	33	1.7	47	1283
8	Indian Agr Res Inst	33	1.7	22	409
9	Agr Coll& Res Inst	31	1.6	13	298
10	Bot Survey India	28	1.4	4	48

Table 6 shows the Top 10 predominant collaborating institutions with the Tamilnadu Agricultural University, Coimbatore as reflected in Web of Science Database. It is clear that Kansas State University has more collaboration with 50 publications with 78 total local citations, 1335 total global citations followed by International Crops Research Institute with 49 publications and Indian Council of Agricultural research with 43 publications.

Table.7. Sponsorship wise in research output Tamil Nadu Agricultural University in Scopus database

Sl. No	Name of the Sponsor	Documents
1.	Indian Council of Agricultural Research	104
2.	Department of Biotechnology, Ministry of Science and Technology, India	89
3.	Department of Science and Technology, Ministry of Science and Technology, India	63

4.	Department of Biotechnology, Government of West Bengal	58
5.	University Grants Commission	55
6.	Department of Science and Technology, Government of Kerala	29
7.	Science and Engineering Research Board	26
8.	Rockefeller Foundation	22
9.	Council of Scientific and Industrial Research, India	18
10.	Ministry of Human Resource Development	17

Table 7 shows the Top 10 predominant sponsors of Tamilnadu Agricultural University, Coimbatore research publications as reflected in Scopus Database. Indian Council of Agricultural Research has supported for 104 research publications followed by Department of Biotechnology, Ministry of Science and Technology, India 89 publications and Department of Science and Technology, Ministry of Science and Technology, India 63 publications and so on.

Country wise Collaboration

Figure 2. Country wise Collaborative research output of Tamil Nadu Agricultural University in Scopus and Web of Science Database

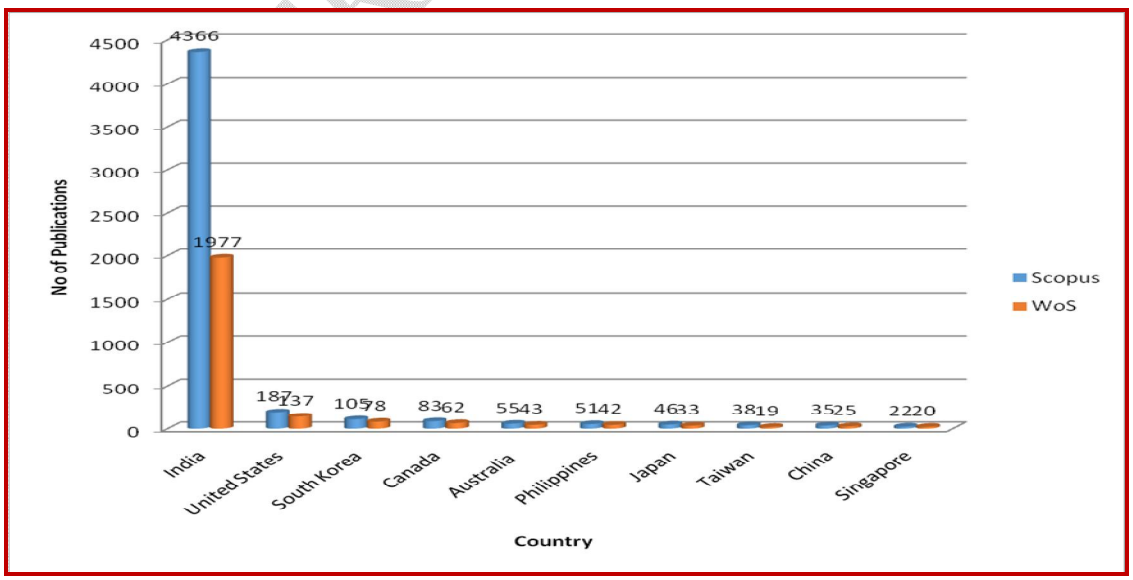
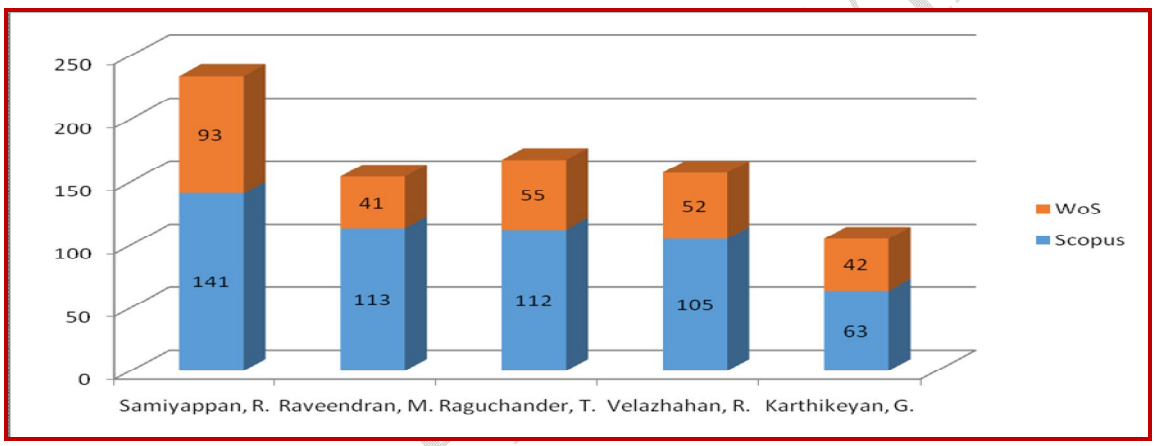


Figure 2 shows the country wise collaboration of research activity by the Tamilnadu Agricultural University, Coimbatore as reflected in Scopus and Web of Science Database for the period of 2001-2020. It is clearly depicted that USA is the predominant country collaborated with 187 in Scopus and 137 in Web of Science followed by South Korea, Canada, Australia and Philippines.

Author wise Distribution of research output of Tamil Nadu Agricultural University

Figure 3: Author wise in research output Tamil Nadu Agricultural University in Scopus and Web of Science database



It is very Clear that Prof Samiyappan R has 141 publications in Scopus and 93 in Web of Science followed by Raveendran M has 113 in Scopus and 41 in WoS, Raguchandar T has 112 in Scopus and 55 in WoS publication as reflected in the database. It shows predominant top 5 influencing authors of Tamilnadu Agricultural University, Coimbatore.

Source wise Distribution

Table.8. Source wise research output of Tamil Nadu Agricultural University in Scopus database

Sl.No	Nameof the journal	Documents
1	Electronic Journal of Plant Breeding	448
2	Pestology	160
3	Archives of Phytopathology and Plant Protection	117
4	Acta Horticulturae	104

5	AMA Agricultural Mechanization In Asia Africa And Latin America	101
6	Research on Crops	81
7	Legume Research	72
8	Indian Journal Of Agricultural Sciences	60
9	Journal Of Biopesticides	60
10	Indian Journal Of Agronomy	58

Table 8 shows the predominant source wise publications of Tamilnadu Agricultural University, Coimbatore as reflected in Scopus Database. Electronic Journal of Plant Breeding has 448 publications, Pestology (160) and Archives of Phytopathology and Plant Protection (117) publications.

Table.9. Source wise research output of Tamil Nadu Agricultural University in Web of Science database

S. No	Journal	Recs	Percent	TLCS	TGCS
1	Legume Research	69	3.5	4	116
2	Ama-Agricultural Mechanization In Asia Africa And Latin America	65	3.3	2	17
3	Indian Journal of Agricultural Sciences	54	2.7	5	80
4	Research on Crops	48	2.4	0	12
5	Current Science	39	2.0	17	368
6	Journal of Food Science And Technology-Mysore	37	1.9	6	247
7	Indian Journal of Agronomy	33	1.7	1	53
8	Plant Archives	30	1.5	1	24
9	Crop Protection	29	1.5	78	1119
10	Indian Journal of Horticulture	28	1.4	4	35

Table 9 shows the predominant source wise publications of Tamilnadu Agricultural University, Coimbatore as reflected in Web of Science Database. Legume Research is the

most predominant journal with 69 publications followed by AMA-Agricultural Mechanization in Asia Africa and Latin America 65 publications and Indian Journal of Agricultural Sciences 54 publications.

Findings of the Study

- Tamilnadu Agricultural University faculty members published more publications in Scopus 4372 compared to Web of Science 1980.
- Articles are the predominant publications by the faculty members of Tamilnadu Agricultural University, Coimbatore 3928 in Scopus and 1822 in Web of Science
- Prof. Samiyappan R is the predominant and most impactful author of Tamilnadu Agricultural University.
- USA is the most predominant country collaborated with Tamilnadu Agricultural University publications about 187 in Scopus and 137 in Web of Science
- Legume Research is the most predominant journal with 69 publications in Web of Science and Electronic Journal of Plant Breeding 448 publications in Scopus.
- Agricultural College and Research Institute, Madurai is the most collaborating institution with 538 publications in Scopus and Kansas State University in Web of Science database.
- Plant Sciences (499), Agronomy (490), Biotechnology Applied Microbiology (190), Horticulture (159) and Environmental Science (129) are the predominant subject areas focused by the faculty members of Tamilnadu Agricultural University in Web of Science and Agricultural and Biological Sciences subject category in Scopus 3317 publications.
- Indian Council of Agricultural Research is the predominant sponsor and supported for 104 research publications followed by Department of Biotechnology, Ministry of Science and Technology, India

Conclusion

Institutional quality is currently assessed using a variety of factors, including contributions to research and innovation in the academic setting. In the Agriculture area, this study highlights the intellectual output of one of the named institutions in the Coimbatore region. Academicians can use a scientometric study to better understand their current situation and the areas of research that need to be addressed. This report provides an

overview of agricultural institution research calamities, which is critical in estimating and moving on with more research and innovation in the field of agriculture.

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