



Research Productivity of Tamil Nadu Agricultural University as Reflected in Scopus Database: A Scientometric Dimension

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Scientometric dimensions of research productivity of the institution helps out to improve the quality of research and the emerging areas to be worked out. In this connection, A scientometric study has been attempted to analyze the research productivity of faculty members of Tamil Nadu Agricultural University for the period of 2001-2020 as recorded in Scopus database. Total of 4372 publications in Scopus were retrieved and analyzed 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. Tamil Nadu Agricultural University faculty members published more publications in Scopus 4372. Articles are the predominant publications by the faculty members of Tamil Nadu Agricultural University, Coimbatore 3928 in Scopus and Prof. Samiyappan R is the predominant and most impactful author of Tamil Nadu Agricultural University. USA is the most predominant country collaborated with Tamil Nadu Agricultural University publications about 187 in Scopus, Electronic Journal of Plant Breeding 448 publications in Scopus. Agricultural College and Research Institute,

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Madurai is the most collaborating institution with 538 publications in Scopus database. 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.

1. INTRODUCTION

India is an agrarian economic 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, emphasized 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 utilizing bibliometric indicators that are based on the estimation of scientific output, which implicitly signals productivity [1,1]. 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 [3,1]. 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. These type research will create awareness among Scientist and board members of the university to encourage effective research and publications in their specialised area for the benefit of universities. So that it will indirectly increase the research quality, output and benefiter of the particular research and organisations.

1.1 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 chartered.

1.2 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, Cite Score, and SJR.

2. REVIEW OF LITERATURE

2.1 Scopus based Researches

Arumugam & Balasubramani [4] 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 [5] 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 [6] 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.

2.2 Institutional Based Researches

Sankar, M [7] 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 [8] 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 [9] 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 [6] 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.

2.3 Objectives of the Study

The primary objective of the study is to analyse the scientific research publications by the faculty members of Tamil Nadu Agricultural University, Coimbatore for the period of 2001-2020 as reflected in Scopus database.

- To analyze the growth pattern of Tamil Nadu Agricultural University
- To explore the document wise and Subject wise research output of Tamil Nadu Agricultural University
- To find out the predominant institutions collaborated with Tamil Nadu Agricultural University
- To figure out the Sponsorship wise, Country wise, Author wise and Sources wise research output of Tamil Nadu Agricultural University

3. METHODOLOGY

The Scopus citation databases are used as a data collection tool and extracted 4372 records in Scopus as on 30 March 2022 for the period of 2001 to 2020 with the search string "Tamil Nadu Agricultural University". The extracted data were analysed percentage analysis, using Biblioshiny

and VoS viewer and a comparative analysis were done with respect of the institution.

3.1 Search Query Employed

AF-ID ("Tamil Nadu Agricultural University" 60025123) OR AF-ID ("Tamilnadu Agricultural University Agricultural Research Station" 60076450) AND (LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013) OR LIMIT-TO (PUBYEAR, 2012) OR LIMIT-TO (PUBYEAR, 2011) OR LIMIT-TO (PUBYEAR, 2010) OR LIMIT-TO (PUBYEAR, 2009) OR LIMIT-TO (PUBYEAR, 2008) OR LIMIT-TO (PUBYEAR, 2007) OR LIMIT-TO (PUBYEAR, 2006) OR LIMIT-TO (PUBYEAR, 2005) OR LIMIT-TO (PUBYEAR, 2004) OR LIMIT-TO (PUBYEAR, 2003) OR LIMIT-TO (PUBYEAR, 2002) OR LIMIT-TO (PUBYEAR, 2001).

3.2 Data Analysis and Interpretation

Table 1 shows the year wise research output of Tamil Nadu Agricultural University as reflected in Scopus database for the period of 2001-2020. It is clear evident that the researchers of TNAU published more publications in Scopus 4372

compared. 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.

3.3 Document Wise Distribution

Fig. 2 shows the document wise distribution of research output of Tamil Nadu Agricultural University as reflected in Scopus database for the period of 2001-2020. It is clear that Articles are the predominant publications by the faculty members of Tamil Nadu Agricultural University, Coimbatore 3928 in Scopus.

Table 2 describes that there are various type of publications are contributed by the faculty members of Tamil Nadu Agricultural University such as Article, Book Chapter, Conference paper, Reviews, Note, Letter, Book, Editorial, erratum, short survey and data paper in which Articles are the predominant source of publications in Scopus by the faculties of the University 89.84%.

It is evident that Professor Samiyappan R. has 141 (3.23%) Scopus publications, followed by Raguchandar T. with 112 (2.56%), and Raveendran M. with 112 (2.56). It lists the top 20 authors who have had the most influence at the Tamil Nadu Agricultural University in Coimbatore.

Table 1. Year wise research output and annual growth rate of Tamil Nadu Agricultural University

Sl. No	Publication Year	Publications	Annual Growth rate
1	2001	122	-
2	2002	92	-24.59
3	2003	114	23.91
4	2004	118	3.51
5	2005	107	-9.32
6	2006	134	25.23
7	2007	172	28.36
8	2008	164	-4.65
9	2009	193	17.68
10	2010	221	14.51
11	2011	180	-18.55
12	2012	195	8.33
13	2013	233	19.49
14	2014	285	22.32
15	2015	294	3.16
16	2016	304	3.40
17	2017	322	5.92
18	2018	292	-9.32
19	2019	396	35.62
20	2020	434	9.60
Total		4372	

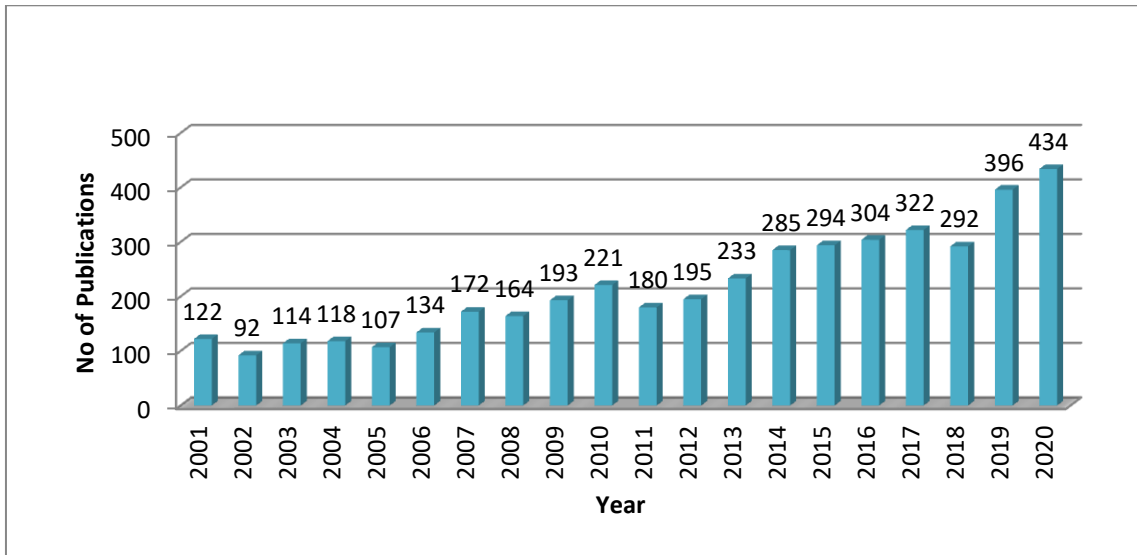


Fig. 1. Growth of publications

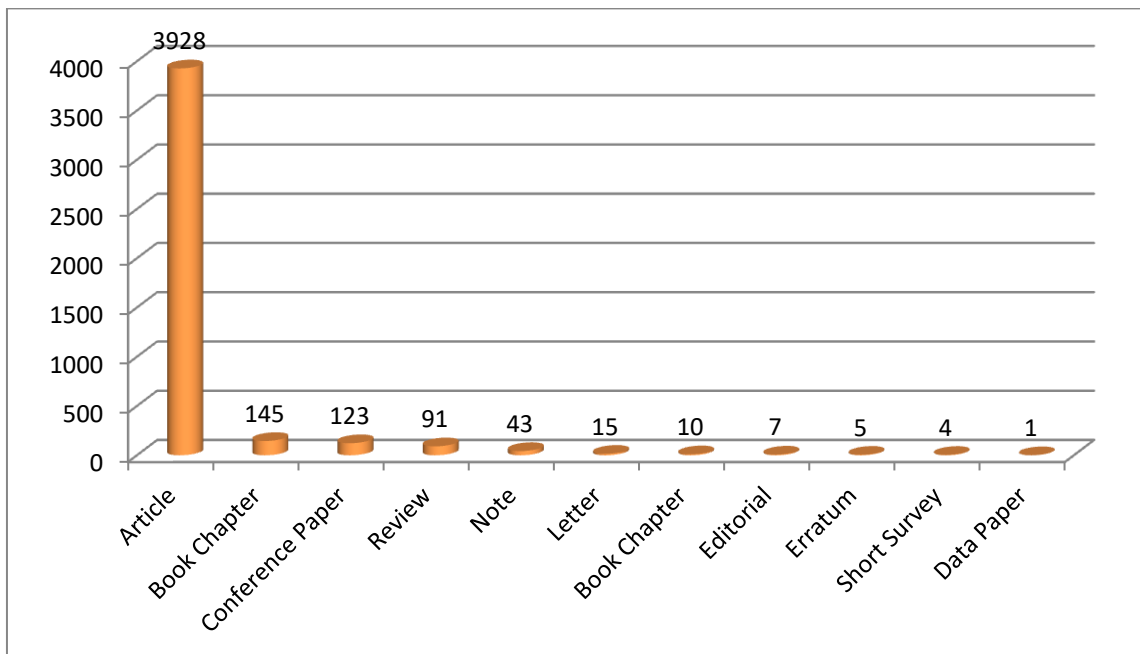


Fig. 2. Document type distribution of Tamil Nadu Agricultural University

Table 4 shows the Top 25 predominant subject categories focussed by the faculty members of Tamil Nadu 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.

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 Tamil Nadu region.

Table 5 shows the Top 10 predominant collaborating institutions with Tamil Nadu

Table 2. Document wise output of Tamil Nadu Agricultural University

Sl. No	Document Type	Scopus	Percent (%)
1	Article	3928	89.84
2	Book Chapter	145	3.32
3	Conference Paper	123	2.81
4	Review	91	2.08
5	Note	43	0.98
6	Letter	15	0.34
7	Book	10	0.23
8	Editorial	7	0.16
9	Erratum	5	0.11
10	Short Survey	4	0.09
11	Data Paper	1	0.02
	Total	4372	100

Table 3. Predominant author of Tamil Nadu Agricultural University

S. No	Name of the Faculty	Publications	Percentage (%)
1.	Samiyappan, R.	141	3.23
2.	Raguchander, T.	112	2.56
3.	Raveendran, M.	112	2.56
4.	Velazhahan, R.	105	2.40
5.	Senthil, N.	79	1.81
6.	Kuttalam, S.	77	1.76
7.	Manivannan, N.	70	1.60
8.	Vanniarajan, C.	65	1.49
9.	Karthikeyan, G.	63	1.44
10.	Nakkeeran, S.	61	1.40
11.	Rabindran, R.	57	1.30
12.	Anandham, R.	55	1.26
13.	Robin, S.	52	1.19
14.	Manonmani, S.	50	1.14
15.	Balasubramanian, P.	49	1.12
16.	Chandrasekaran, S.	49	1.12
17.	Kathirvel, K.	48	1.10
18.	Subramanian, K.S.	46	1.05
19.	Balachandar, D.	43	0.98
20.	Mohankumar, S.	43	0.98

Table 4. Subject wise research output of Tamil Nadu Agricultural University

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

Table 6 shows the Top 10 predominant sponsors of Tamil Nadu 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.

3.4 Country Wise Collaboration

Fig. 3 shows the country wise collaboration of research activity by the Tamil Nadu Agricultural University, Coimbatore as reflected in Scopus Database for the period of 2001-2020. It is

clearly depicted that USA is the predominant country collaborated with 187 in Scopus.

3.5 Source Wise Distribution

Table 7 shows the predominant source wise publications of Tamil Nadu 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 5. Collaborative institutions

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 Dharma lingam Agricultural College and Research Institute	68
9.	Rajasthan Agricultural University, Agricultural Research Station	65
10.	Kansas State University	59

Table 6. Predominating sponsors of Tamil Nadu Agricultural University

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. Source wise research output of Tamil Nadu Agricultural University

Sl. No	Name of 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

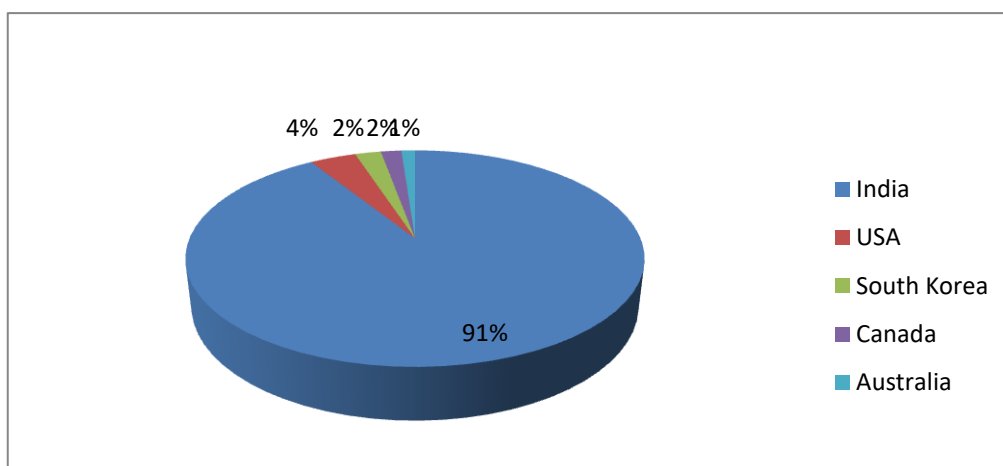


Fig. 3. Country wise collaborative research output of Tamil Nadu Agricultural University in Scopus Database

4. FINDINGS OF THE STUDY

- Tamil Nadu Agricultural University faculty members published more publications in Scopus database in the recent years. 2015 onward there is an increasing trend of publications.
- Articles are the predominant publications by the faculty members of Tamil Nadu Agricultural University, Coimbatore 3928
- Prof. Samiyappan R is the predominant and most impactful author of Tamil Nadu Agricultural University.
- USA is the most predominant country collaborated with Tamil Nadu Agricultural University publications about 187.
- Electronic Journal of Plant Breeding is the most predominant journal with 448 publications in Scopus database.
- Agricultural College and Research Institute, Madurai is the most collaborating institution with 538 publications
- 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

5. CONCLUSION

Research output 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 [10-12]. 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. The future of the research will very useful and information for the strengthening in the institutional ranking and other parameters.

6. SCOPE AND LIMITATIONS

The present study is limited to the publications of Tamil Nadu Agricultural University, Coimbatore in Scopus database only. The study is limited to the publications period of 2001 to 2020.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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