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RESEARCH OUTPUT ON ORGANIC FARMING A SCIENTOMETRIC STUDY RETRIEVED FROM THE WEB OF SCIENCE DATABASE

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Abstract

This study's main objective is to look at the publications' research output in organic farming from 2011 to 2020. The Web of Science was used to collect the information for this view, which were then processed with tools like Histcite and interpreted in Microsoft Excel. Here, the relative growth rate, doubling time, exponential growth rate, and degree of collaboration indexes are also used to explain the analysis for the nation, organisation, and language-wise publications.

Keywords: Bibliometrics, Scientometrics, RGR, Organic Farming

INTRODUCTION

The quantitative aspects and traits of science and scientific inquiry are the focus of scientometrics. The focus is on research projects that use statistical and mathematical techniques to examine how science develops and operates. Original studies, brief communications, early reports, review papers, letters to the editor, and book reviews on scientometrics are published in the journal. The journal is essential to researchers and administrators because of its interdisciplinary nature. It offers librarians and documentarians in key scientific agencies, ministries, research institutes, and laboratories invaluable support. The brand new journal Scientometrics was published in 1978 and featured prominent historians, philosophers of science, and social

scientists, including Robert Sary. Merton published an edited volume. Metrics of technological know-how: the advent of technological indicators in which they meditated new perspectives (Elkhana et al., 1978). Historian Derek J. De Solla Sarge published a number of books and articles in the sixties and seventies that laid the foundation for a new emerging field of technical knowledge research. Throughout the nineteen eighties, however, the sociology of technical knowledge developed increasingly in a microanalytical direction that focused on the behavior of scientists in laboratories. From this point of view, quantitative analysis of the medical literature at the macro level is not considered a useful tool for providing explanations for scientific practices. Instead, with an awareness of medical communications as a unit of analysis for scientists, scientific metrics advanced hand-in-hand in the direction of sociology of technology and library and information science.

ORGANIC FARMING

The concept of natural agriculture was developed within the early 1900s by way of Sir Albert Howard, F.H. King, Rudolf Steiner, and others who believed that using animal manures (regularly made into compost), cowl crops, crop rotation, and biologically based totally pest controls ended in a higher farming device. Howard, having labored in India as an agricultural researcher, received a whole lot of suggestions from the sustainable farming practices he encountered there and endorsed for its adoption within the West. Such practices were further promoted with the aid of various advocates inclusive of J.I. Rodale and his son Robert, in the 1940s and onwards, posted organic Gardening and Farming magazine and a number of texts on natural farming. The call for organic meals changed into inspired in the 1960s by means of the publication of *Silent Spring*, by Rachel Carson, which documented the volume of environmental harm due to pesticides. Natural farming is a way of crop and cattle manufacturing that includes rather than pesticides, fertilizers, genetically changed organisms, antibiotics, and boom hormones. Organic manufacturing is a holistic gadget designed to optimize the productiveness and health of numerous groups within the agroecosystem, such as soil organisms, vegetation, farm animals, and people. The important intention of natural manufacturing is to broaden enterprises that can be sustainable and harmonious with the environment. Organic farming may be described as a device of control and agricultural production that combines an excessive degree of biodiversity with environmental practices it preserves natural assets and has rigorous requirements for animal welfare. Moreover, natural farming responds to consumer growing calls for natural products and concurrently permits to hold the environment inside the context of sustainable rural improvement.

LITERATURE REVIEW

Shi, C., Qu, L., Zhang, Q., & Li, X. (2021). Performed a quantitative analysis of literature associated with comprehensive SPF usage over the many years (1946–2019) through using scientometrics techniques, with the goals to (1) pick out the studies hotspots and summarize the relevant research approaches in one-of-a-kind

time intervals; (2) screen the temporal evolution of these hotspots. Our effects showed: 1) research on SpF dramatically multiplied over the last few long time (1946–2019), which can be classified into four chronological intervals (I, II, III, and IV); (2) studies regarding land productiveness development and hydrological and erosion approaches onSpF.Kamali, M., etal., (2020). Examine scientometric evaluation on the utility of biochips for soil amendment in order to investigate the studies and tendencies in this field and to become aware of the existing gaps to provide recommendations for destiny studies. A total of 2982 bibliographic statistics were retrieved from the internet of technological know-how (WoS) database with the use of appropriate sets of keywords, and these have been analyzed based on the criteria of authors, publishing journals, citations received, contributing international locations, organization, and categories in research and development. Based on these facts, the progress of studies changed into mapping to discover the scientific repute, which includes contemporary clinical and technological developments as well as the knowledge gaps. Most people with medical tendencies started out in the early 2000's and elevated extensively after 2014. Suresh&Thanuskodi (2019). Carried out scientometric take a look at on seed technology research courses. Records for a have a look at i.E., 8576 were downloaded and analyzed consistent with goals. They take a look at found that the boom of literature follows the lining boom sample, journal articles are the most published shape of literature (seventy-three. Eighty-three%), international journal of meals science and era accompanied by way of NongyeGongchengXuebao Transactions of The Chinese language Society of Agricultural Engineering are the pinnacle journals, and Chinese Academy of Sciences are top research contributing organization. The fantastically productive situation regions are Agriculture and organic Sciences.

OBJECTIVES

- To identify the year wise and source wise distributions of Organic Farming publications.
- To find out the language-wise and organizational wise contribution.
- To identify the most prolific author and most productive country during the study period.
- To identify the nature of collaboration and their index.
- To trace the collaboration of co-authorship patterns and author productivity.
- To determine Relative growth rate and doubling time.
- To identify the degree of collaboration and Exponential Growth rate.

METHODOLOGY

Bibliometric information for the term "Organic Framing" was gathered from the Clarivate Analytics-published Web of Science bibliographic database (WOS). It covers the years 2011 to 2020, and 2,969 records in total were analyzed using Histcite and Web of Science Analysis. Microsoft Excel data was used for calculations.

DATA ANALYSIS**Table:1 Year wise Publications**

S. No.	Publication Year	Records	Percentage	TLCS	TGCS
1.	2011	275	8.5	693	0
2.	2012	259	8.7	945	1218
3.	2013	264	8.9	468	5019
4.	2014	247	8.3	483	4219
5.	2015	278	9.4	495	4887
6.	2016	301	10.1	250	3555
7.	2017	328	11.0	213	3836
8.	2018	317	10.7	150	2397
9.	2019	341	11.5	78	1270
10.	2020	359	12.8	10	446
Total		2969	100	3785	26847

Table No. 1 shows the year wise distribution of publication in Organic Farming research output during the period 2011 - 2020 (10years). The highest number of publications i.e.,359 (12.8 %) was published in the year 2020. The lowest numbers of publications were 247 (8.3 %) found in 2014. The study exposes that majority of articles was published in 2020 it was initiated the study evolution in terms of productivity. Through there was a growth identified and (2015 to 2020) there was a decreasing trend found during the period 2011 -2014.

Table: 2 Author wise Distribution

S. No.	Author	Records	Percentage	TLCS	TGCS
1.	Mader P	36	1.2	322	1130
2.	Tscharntke T	21	0.7	154	425
3.	Leifert C	20	0.7	79	450
4.	Canali S	19	0.6	47	174
5.	Gattinger A	18	0.6	178	611

6.	Moudry J	18	0.6	16	74
7.	Sans FX	18	0.6	57	139
8.	Olesen JE	17	0.6	92	320
9.	Batary P	16	0.5	89	360
10.	Armengot L	15	0.5	52	139
11.	Campanelli G	15	0.5	39	136
12.	Diacono M	15	0.5	21	113

Table No. 2 reveals about authorship contribution among the top twelve records. It is noted that Mader P 36 (1.2) % is the first author Tscharntke T contributed by 21 (0.7%) articles with third author Leifert C contributed 20 (0.7%) articles with fourth author Canali S contributed by 19 (0.6%). This study examined that Mander P is the highest contribution among the top twelve authors (2011 – 2020).

Table: 3 Year wise Authorship Pattern

Year	Single Author	Double Author	Three Author	Above three Author	Total
2011	30	35	56	154	275
2012	18	36	56	149	259
2013	16	52	48	148	264
2014	14	39	34	160	247
2015	23	28	50	177	278
2016	17	40	54	190	301
2017	17	47	61	203	328
2018	21	30	59	207	317
2019	20	33	54	234	341
2020	15	34	64	246	359
Total	191	374	536	1868	2969

Table No. 3 examined that the authorship pattern to determine the type of research and their percentage, it finds that the authorship pattern during 2011 – 2020 with 2969 records. The highest number (2020) produced by authors were 359 records. The lowest records output in the year 2014 and produced by authors were 247 records. Among the authorship pattern the above three authors' total value is high 1868, and the lowest records in single author total is 191.

Table: 4 Single Author v/s Multi Author

S. No.	Author	Publications	Percentage
1	Single author	191	6.4
2	Multi author	2778	93
Total		2969	99.4

Table No. 4 classified the study in to two phases viz., the first phase was Single author and next phase Multi author. It is clear that Single author records are 191 (6.40%) and Multi authors records are 2778 (93%). Majority of the articles was published by multi author during 2011 - 2020. Single author contributions are very less number compared to multi author papers.

Table: 5 Degree of Collaboration

Year	Single Author (Ns)	Multi Author (Nm)	Total Number of (Ns + Nm)	Percentage
2011	30	245	275	0.90
2012	18	241	259	0.93
2013	16	248	264	0.93
2014	14	233	247	0.94
2015	23	255	278	0.91
2016	17	284	301	0.94
2017	17	311	328	0.94
2018	21	296	317	0.93
2019	20	321	341	0.94
2020	15	344	359	0.95
Total	191	2778	2969	9.31

Table No.5 that the degree of collaboration in during 2011 - 2020. The degree of collaboration 9.31. The highest level of contribution is produced in the single author publication in 2011 articles 30 (0.90 %). The lowest level of contribution is produced in the single author publication in 2014 articles 14 (0.94 %). The

highest level of contribution is produced in the multi author in 2020 article 344 (0.95 %). The lowest level of multi author publication in 2014 article 233 (0.94 %).

Table: 6 Exponential Growth Rate

Year	No of Publication	Percentage
2011	275	0
2012	259	0.94
2013	264	1.01
2014	247	0.93
2015	278	1.12
2016	301	1.08
2017	328	1.08
2018	317	0.96
2019	341	1.07
2020	359	1.05
Total	2969	9.24

Table No. 6 shows that Exponential Growth Rate of publications in Organic Farming during the period 2011-2020 (10 years). The highest growth rate was 1.12 % found in 2015 with 278 publications. The lowest growth rate was 0.93 % with 247 publications in 2014. It is also found that the Exponential Growth Rate was found to be 9.24 % and average growth rate.

Table: 7 Co-Authorship Index

Year	Single Author	CAI	Two Author	CAI	Three Author	CAI	Above Three Author	CAI	Total
2011	30	166	35	100	56	111	154	88	275
2012	18	112	36	112	56	125	149	87	259
2013	16	100	52	162	48	100	148	87	264
2014	14	87	39	125	34	75	160	100	247
2015	23	133	28	77	50	100	177	100	278
2016	17	79	40	99	54	99	190	100	301
2017	17	72	47	109	61	100	203	90	328
2018	21	100	30	80	59	110	207	110	317
2019	20	90	33	72	54	90	234	109	341
2020	15	58	34	75	64	91	246	108	359
Total	191		374		536		1868		2969

Table No. 7 indicates the Co-authorship Index for the single author publications during period of the study (2011 - 2020). The CAI for single author is declined from 166 in the year 2011 to 58 in the year 2020. On the other hand, the CAI for double author is enhanced from 100 in the year 2011 to 75 in the year 2020, and then the CAI for three author is declined from 111 to 91, and above three CAI started from 88 to 108 during the study period (2011 - 2020).

Table: 8 Collaboration of Index

Year	Total No. of paper (NP)	Total No. of Authors (NA)	Collaboration of Index (NA/NP)
2011	275	1141	4.14
2012	259	1097	4.23
2013	264	1163	4.40
2014	247	1194	4.83
2015	278	1228	4.41
2016	301	1475	4.90
2017	328	1554	4.73
2018	317	1509	4.76
2019	341	1668	4.89
2020	359	1843	5.13
Total	2969	13872	46.42

Table No. 8 shows the Collaboration Index in Organic Farming during the period 2011 - 2020. The collaboration of Index range start from 4.14 and slightly increased to 5.13. The overall collaboration of Index was 46.42.

$$CI = \frac{NA}{NP}$$

CI = Collaboration of Index

NA = Total no. of Authors

NP = Total no. of Papers

Table: 9 Author Productivity

Year	Total No. of Papers (NP)	Total No. of Authors (NA)	AAPP (NA/NP)	Percentage (NP/NA)
2011	275	1141	4.14	0.24
2012	259	1097	4.23	0.23
2013	264	1163	4,40	0.22
2014	247	1194	4.83	0.20
2015	278	1228	4.41	0.22
2016	301	1475	4.90	0.20
2017	328	1554	4.73	0.21
2018	317	1509	4.76	0.21
2019	341	1668	4.89	0.20
2020	359	1843	5.13	0.19
Total	2969	13872	42.2	2.12

Table No. 9 shows the Author Productivity in Organic Farming research output during the period 2011 - 2020. The highest number of author productivity is 5.13 (0.19 %) published in 2020, the lowest number of author productivity is 4.14 (0.24 %) published in 2011. The total no. of author productivity is 42.2 (2.12 %).

Table: 10 Relative Growth Rate

Year	Number of Articles	Total Community	W1	W2	R(a) W2-W1	Mean R (a)	Doubling Time Dt(a)	M Dt(a) 1-2
2011	275	275	-	5.61	-	0.054		11.4
2012	259	534	5.61	5.55	0.06		10.6	
2013	264	798	5.55	5.57	0.02		31.9	
2014	247	1045	5.57	5.50	0,07		9.12	
2015	278	1323	5.50	5.62	0.12		5.32	
2016	301	1624	5.62	5.70	0.08	0.068	7.9	10.3
2017	328	1952	5.70	5.79	0.09		7.1	
2018	317	2269	5.79	5.75	0.04		15.9	
2019	341	2610	5.75	5.83	0.08		7.9	
2020	359	2969	5.83	5.88	0.05		12.7	
Total	2969					0.061		10.8

Table No. 10 reveals the data on the relative growth rate and doubling time of Organic Farming research output at the international level. The growth of literature is derived by counting the number of publications published (2011 – 2020). The changes in size of literature over a specific period maybe termed as growth of literature. Relative growth rate (RGR) and doubling time (DT) are identified and classified accordingly.

The growth rate i.e., 0.06 in 2012, got increased up to 0.12 in 2015. The relative growth rate in 2016 was 0.08 and got decreased in 2020 (0.05). The lowest relative growth rate was 0,02 in 2013. The lowest doubling time for publication is 5.62 in 2015. The doubling time for publication at the level increased in 2013 (31.9).

Table: 11 Journal wise Distribution

S. No.	Journal	Records	Percentage	TLCS	TGCS
1.	Agriculture ecosystems and environment	102	3.4	335	1678
2.	Renewable agriculture and food systems	63	2.1	202	411
3.	Agronomy – basel	58	2.0	0	92
4.	Agronomy for sustainable development	50	1.7	93	1044
5.	Journal of clearer production	39	1.3	69	691
6.	Biological agriculture and horticulture	37	1.2	24	147
7.	Agroecology and Sustainable food system	36	1.2	27	192
8.	European journal of Agronomy	35	1.2	100	569
9.	Applied soil Ecology	32	1.1	65	586
10.	Journal of applied Ecology	31	1.0	216	801

11.	Land use policy	30	1.0	66	399
12.	Fourrages	28	0.9	2	20

Table No. 11 represents the list of top 12 journals in which the publications of Organic Farming are found in various document type. “Agriculture Ecosystems Environment” journal published 102 records (34%). It stands first with 335 Total Local Citations (TLCS) and gained 1678 Total Global Citations (TGCS). Second journal is “Renewable Agriculture and Food Science” with 63 records (2.1%) and “Agronomy- Basel” with 58 records (2.0%) is placed third in the list.

Table: 12 Keyword wise Distribution

S. No.	Word	Records	Percentage	TLCS	TGCS
1.	Organization	1637	55.1	2970	14093
2.	Farming	880	29.6	1791	7556
3.	Soil	393	13.2	604	4202
4.	Convention	363	12.2	943	3633
5.	Systems	311	10.5	494	2741
6.	Production	261	8.8	211	1855
7.	Management	258	8.7	329	2406
8.	Effects	222	7.5	575	2762
9.	Crop	201	6.8	314	1961
10.	Quality	189	6.4	228	1411
11.	Effects	168	5.7	130	1228
12.	Yield	159	5.4	185	1145

Table No. 12 indicates the keywords appeared in the field of Organic Farming. The frequency of occurrence of words among the publications revealed that the word “Organic” is highest with 1637 (55.1%) records stands with 2970 Total Local Citation (TLCS) and 14093 Total Global Citations (TGCS). This is followed by the word “Farming” which occurred in 880 (29.6%). And the word “Soil” which occurred in 393 (13.2%) publications. The study mainly considers the publications from top twelve articles.

Table: 13 Document type Distribution

S.No.	Document Type	Records	Percentage	TLCS	TGCS
1.	Article	2245	75.6	1902	21858
2.	Review	150	5.1	319	4488
3.	Article; Early Access	20	0.7	0	7
4.	Editorial Material	20	0.7	8	51
5.	Article; Proceedings Paper	19	0.6	27	178
6.	Meeting Abstract	15	0.5	0	4
7.	Letter	7	0.2	21	56
8.	Book Review	6	0.2	0	0
9.	Review; Book Chapter	6	0.2	15	165
10.	Review; Early Access	2	0.1	0	4
11.	Article; Book Chapter	1	0.0	5	31
12.	Article; Data Paper	1	0.0	0	5

The above table presents the analysis of different type of documents identified from Organic Farming research i.e., 2245 (75.6%). Review with 150 (5.1%), Article, Early Access and Editorial Material with 20 (0.7%), Article Proceeding Paper with 19 (0.6%), Meeting Abstract with 15 (0.5%), Letter with 7 (0.2%), Book Review and Book Chapter with 6 (0.2%), Review; Early Access with 2 (0.1%), Article, Book Chapter and Article; Data Paper with 1 (0.0%), were tabulated for better understanding.

Table: 14 Language wise Distribution

S. no.	Language	Records	Percentage	TLCS	TGCS
1.	English	2371	79.9	2280	26688
2.	German	50	1.7	8	37
3.	French	46	1.5	6	61
4.	Portuguese	15	0.5	1	34
5.	Czech	4	0.1	2	5

6.	Polish	4	0.1	0	7
7.	Spanish	4	0.1	0	10
8.	Japanese	1	0.0	0	0
9.	Turkish	1	0.0	0	5
10.	Unspecified	1	0.0	0	0

Table No. 14 shows the language wise distribution of Organic Farming research during the period 2011 - 2020. It is noticed that the records are through effected English Language in almost all the countries, 50 are (1.7 %) in German, 46 are (1.5 %) in French, 15 are (0.5 %) in Portuguese 4 are (0.1 %) in Czech, Polish and Spanish. Each one (0.0 %) in Japanese and Turkish. This study disclosed that the majority research work on Organic Farming were found (79.9 %) in English Language.

Table: 15 Institution wise Distribution

S. No.	Institution	Records	Percentage	TLCS	TGCS
1.	INRA	94	3.2	188	1757
2.	Swedish Univ Agr Sci	64	2.2	143	1805
3.	Aarhus Univ	50	1.7	74	830
4.	Res Inst Organ AgrFiBL	48	1.6	118	1069
5.	Univ Kassel	43	1.4	56	629
6.	Univ Hohenheim	40	1.3	55	385
7.	Agroscope	37	1.2	66	934
8.	Univ Copenhagen	35	1.2	21	369
9.	Wageningen Univ	29	1.0	75	906
10.	Tech Univ Munich	28	0.9	65	485
11.	Univ Pisa	25	0.8	29	275
12.	Univ Gottingen	24	0.8	71	981

Table No. 15 indicates the total number of publications in Organic Farming along with top 12 institutions involved during the period 2011 - 2020. The international level of institution wise contribution of

INRA was 94 (3.2 %). Research output comes from institution Swedish University was 64 (2.2 %) followed by Aarhus Uni 59 (1.7 %). The study reveals that the Unknown had published majority of the articles among top twelve countries.

Table: 16 Country wise Distribution

S. No.	Country	Records	Percentage	TLCS	TGCS
1.	Germany	329	11.1	429	4523
2.	Italy	321	10.8	351	4289
3.	USA	302	10.2	315	4506
4.	France	224	7.5	306	3301
5.	Spain	202	6.8	136	2987
6.	Switzerland	146	4.9	434	3297
7.	India	128	4.3	61	1380
8.	UK	128	4.3	492	3608
9.	Poland	126	4.2	72	806
10.	Brazil	111	3.7	70	1469
11.	Sweden	105	3.5	291	2769
12.	Peoples R China	98	3.3	39	1069

Table No. 16 shows that the total number of publications in Organic Farming with collaboration during the period 2011 – 2020 India had 128 (4.3 %), the records and stands with 61 Total Local Citation (TLCS), and 1380 Total Global Citation (TGCS). The study disclosed that the majority of the articles produced among the top thirteen countries is Germany with 329 (11.1 %).

Table: 17 Arithmetic Mean

Year	Total No. of Publications	Total	Arithmetic Mean
2011	275	2969	296.9
2012	259		
2013	264		
2014	247		
2015	278		
2016	301		
2017	328		
2018	317		
2019	341		
2020	359		

Table 17 shows that the Arithmetic Mean value on the year wise. The average of the arithmetic mean value was 296.9. The arithmetic mean set of value is the ratio of their sum of the total number of values in the set. Thus, if there are total of “n” number in data set. Whose value the arithmetic mean of these values, represented by “M” can be found using this formula.

$$AM = \frac{x_1 + x_2 + \dots + x_n}{n}$$

DISCUSSION

• It was found that the year 2020 contributed 359 papers (12.8%) to the total number of papers published, whereas the year 2014 contributed 247 papers (8.3%). It ranks first in terms of the overall number of publications in the English language with 2371 papers (79.9%). It reveals that the majority of the world's population speaks English and establishes English as the universal tongue. The investigation reveals that Mader P. contributed the most publications, with 36 articles (1.2%). The research period's growth rate is 9.24. Growth rate exhibits both rising and falling patterns across the research period. The average collaboration index for this study period is 46.42. According to the survey, there were 13872 authors who produced 2969 papers, for an average author output of 2.12%. The mean relative growth rate was 0.054 from 2011 to 2015, and it grew to 0.068 from 2016 to 2020. The doubling time value for the entire study period is 10.8. Additionally, it was discovered that the exponential growth rate for the keyword "Organic Farming" was 9.24 and that the average growth rate had positive values, indicating an upward tendency. The study period's level of collaboration is 9.31. The research period's exponential growth rate is 9.24. The growth rate exhibits both upward and downward tendencies in the time spent studying.

CONCLUSION

Different statistical techniques are used to analyze the citation and authorship patterns as well as the field-specific organizational structure. Research Productivity on Organic Farming using the Web of Science Database: A Scientometrics Study has shown to be valuable tools in the study. Scientometrics analysis of this study has been highlighted to quantify different reviews, including authorship pattern, level of collaboration, exponential growth rate, co-authorship index, and relative growth rate, which may be estimated in the tables covering 2,969 publications between 2011 and 2020.

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