
Authorship Pattern of Coffee Plantation Research in India

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Abstract

On the application side, it is “Coffee Plant” research which is believed to be an Agriculture subject exclusively. But it is not. It is multi-disciplinary in nature encompassing many fields from Science, Medicine, Humanities and Social Sciences subjects. Hence the source database identified is WOS which includes Engineering also.

Objectives of the study

In this study the investigator presents the Scientometrics analysis of the Coffee Plant research literature (2000 – 2012) from India in a global context. Hence, the study aims to collect the global output data in Coffee Plant in order to fix up the relative position of India while fulfilling the major objective of identifying the dimension of literature output in Coffee Plant research from India. The main objectives of the present study are as follows:

- To find out the quantitative and qualitative aspects of the world literature Output in Coffee Plant research as found recorded in Web of Science between 2000 and 2012;
- To find out the growth rate of Coffee Plant research literature output during the years covered under the present study.
- To map the authorship pattern in the Coffee Plant research literature output and the strength and weakness of authorship clusters;

Scope of the study

The study aims to map the structure of Coffee Plant research literature output at the national level from India in the context of global performance – in order to get a comparative picture of Indian research performance and thus to know where India stands among the various countries of the world. Based on the analysis, the study aims to arrive at future course of projections in authorship pattern, language and country of publications. In addition, the study proposes to apply the empirical laws of Lotkas; Bradford; and Price.

The electronically organized and consolidated primary and secondary database of publications are immense, accurate and updated continuously. This well-articulated, documented record in standardized format facilitates Scientometric and Bibliometric analysis of research literature output.

Methodology

The data has been compiled from online journal articles. For each article following data have been noted: Name of the Authors, Number of Authorship, Number of References, Authors Geographical Affiliated, Length of Articles, Sources of Citations, Journal Self-Citation, Author Self-Citation and other data required for the study. All the necessary information are compiled, recorded, tabulated and analyzed for making observations as indicated in the objectives of the study.

Data Collection

The data required for the investigation was downloaded from the Web of Science, published online by Thomson Reuters, (Institute for Scientific Information, Philadelphia), USA. Web of Science database was searched in April 2013 to obtain the universe of research volume of data in the field of Coffee Plant from January 1, 2000 to December 31, 2012. Download was not restricted to the data of records pertained to India alone.

The prime key used for search and download was Coffee Plant besides the publication date. Subsequently relevant keywords were used for sorting the downloaded records. The data captured was subjected to data cleaning operation and deletion of duplicate records, thereby ensuring a perfect set of data required for the study.

Sample Size

The data thus obtained finally resulted in a total of 10553 records for all the 13 years under coverage. The total number of Coffee Plant research contributions over the period, under individual year labels 2000 – 2012 has been used as the index of total Coffee Plant research production.

Year-Wise Distribution of Citations

S. No.	Year	No. of Citations	Percentage	Cumulative Percentage
1	2000	15740	11.45	11.45
2	2001	11426	8.31	19.76
3	2002	16006	11.64	31.40
4	2003	13430	9.77	41.17
5	2004	18104	13.17	54.34
6	2005	15091	10.97	65.31
7	2006	12750	9.27	74.58
8	2007	9902	7.20	81.78
9	2008	9356	6.80	88.58
10	2009	7325	5.33	93.91
11	2010	4567	3.32	97.23
12	2011	2368	1.72	98.95
13	2012	1444	1.05	100.00
Total		137509	100.00	

The overall distribution pattern of citations of Research Literature in Coffee Plant during the period 2000-2012 for 10553 Articles is 137509. The above table represents the year-wise distribution of citation during the study period. It is noted that citation scored in 2004 attains the first place with respect to overall citations, which has shared 13.17 percent, references cited in 2002 comes in the second place sharing 11.64percent with 16006 references and references cited in 2012 gets the last place sharing 1.05 percent. There is a sub total of 137509 references in the 10553 articles of Research Literature in Coffee Plan with 13.03 references per article.

Distribution of References by Articles

S. No	Year	Articles	No. of Citations	Cumulative Percentage		Average Citation per Article
				Percentage	Cumulative Percentage	
1	2000	470	15740	11.45	11.45	33
2	2001	456	11426	8.31	19.76	25
3	2002	517	16006	11.64	31.40	30
4	2003	569	13430	9.77	41.17	23
5	2004	637	18104	13.17	54.34	28
6	2005	746	15091	10.97	65.31	20
7	2006	743	12750	9.27	74.58	17
8	2007	876	9902	7.20	81.78	11
9	2008	987	9356	6.80	88.58	9
10	2009	1071	7325	5.33	93.91	6
11	2010	1093	4567	3.32	97.23	4
12	2011	1157	2368	1.72	98.95	2
13	2012	1231	1444	1.05	100.00	1
Total		10553	137509	100		16

The above table shows the distribution of references by volume. Overall distribution pattern of citation in Research Literature in Coffee Plant during the study period 2000-2012 contained 137509 references in 10553 articles and each article has an average of 16 articles.

Growth Rate of Coffee Plant Research Literature: Global Output

S.No	Publication Year	Count	Growth Rate
1	2000	470	
2	2001	456	-0.03
3	2002	517	0.13
4	2003	569	0.10
5	2004	637	0.12
6	2005	746	0.17
7	2006	743	-0.00
8	2007	876	0.18
9	2008	987	0.13
10	2009	1071	0.09
11	2010	1093	0.02
12	2011	1157	0.06
13	2012	1231	0.06

The above table displays the annual growth rate of global literature output in Coffee Plant. It is found that the growth rate was at a maximum in the year 2012 and at its minimum in 2001. Further it is found that the growth rate of research in Coffee Plant was found to be positive during all the years except during 2007 and 2012 – 2001 and 2006 both years indicating negative growth. In an overall view the average annual growth rate of Coffee Plant research at the global level was found to be 0.08.

Time Series Analysis

S.No	Year	Count (Y)	X	X ²	XY
1	2000	470	-6	36	-2820
2	2001	456	-5	25	-2280
3	2002	517	-4	15	-2068
4	2003	569	-3	9	-1707
5	2004	637	-2	4	-1274
6	2005	746	-1	1	-746
7	2006	743	0	0	0
8	2007	876	1	1	876
9	2008	987	2	4	1974
10	2009	1071	3	9	3213
11	2010	1093	4	16	4372
12	2011	1157	5	25	5785
13	2012	1231	6	36	7386
Total		10553	0	181	12711

Straight line equation is applied to arrive at projections for future growth under Time Series analysis.

Straight Line equation $Y_c = a + bX$

Since $\sum x = 0$

$a = \sum Y/N = 10553/13 = 811.77$; $b = \sum XY/\sum x^2 = 12711/181 = 70.23$

Estimated literature in 2017 is when $X = 2017 - 2006 = 11$

$= 811.77 + 70.23 * 11 = 811.77 + 772.53 = \mathbf{1584.30}$

Estimated literature in 2020 is when $X = 2020 - 2006 = 14$

$= 811.77 + 70.23 * 14 = 811.77 + 983.22 = \mathbf{1794.99}$

On the application of the formula of Time Series Analysis and subsequently, from the results obtained separately for the years 2020 and 2017, it is found that the future trend of growth in Coffee Plant research output may take an increasing trend during the years to come. The inference is that there is a positive growth at the global level in research literature output in Coffee Plant.

Authorship Pattern – Year wise Distribution

N of Authors	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
1	165	172	175	243	252	268	279	285	298	311	321	330	339	3438
2	85	89	102	114	125	119	122	134	183	239	242	245	251	2050
3	71	78	86	85	88	86	92	102	136	141	152	159	196	1472
4	59	64	68	75	71	78	79	84	88	83	96	94	99	1038
5	42	48	52	54	58	59	59	55	57	65	61	66	75	751
6	21	22	21	27	29	30	27	33	35	37	39	39	40	400
7	20	21	21	26	27	28	22	31	31	32	32	35	34	360
8	11	11	10	15	10	14	22	20	29	24	25	26	29	246
9	10	10	12	10	11	09	15	15	18	19	21	22	23	195
10	09	09	08	09	07	05	05	06	12	14	13	21	21	139
11	08	10	09	04	06	08	09	10	10	14	15	18	19	140
12	08	09	09	04	05	04	06	09	06	05	09	11	15	100
13	03	01	00	05	06	04	07	05	08	06	09	09	09	72
14	01	03	03	04	05	02	04	04	06	05	05	06	07	55
15	00	03	02	02	01	00	01	03	02	02	02	03	04	25
16	00	01	01	02	03	00	00	02	00	02	03	02	03	19
17	00	00	01	01	01	02	02	00	01	01	01	03	03	16
18	01	00	03	01	00	00	00	01	01	00	02	02	03	14
19	00	01	02	00	00	01	01	00	01	00	01	02	02	11
20	00	01	00	01	01	00	02	01	00	00	00	00	02	8
21+	01	00	00	00	00	00	01	01	00	01	00	00	00	4
Total	2515	2554	2587	2685	2710	2722	2761	2808	2930	3010	3059	3104	3186	10553

Year wise distribution of author groups and their publication count over a period of thirteen years revealed interesting results. Single authored papers shows growing trend from the year 2000 to 2011 the maximum productivity was 339 in the year 2012. Regarding two (Joint) authored publications, the maximum output recorded was 251 with performance during 2012 followed by 245 publications in the years 2011.

Publications by category of three authors showed a maximum output of 196 and 159 numbers in the years 2012 and 2011 followed by 242 numbers in the year 2010. Regarding the category of four authors, a maximum output was recorded in the year 2012 (99) followed by an equal 96 counts each in the year 2010. Regarding the category of six authored publications, there was increase in the productivity and the maximum (40 counts) was found in the year 2012.

Joint Authored Publications – Trend Analysis

S.No	Year	Count (Y)	X	X ²	XY
1	2000	85	-6	36	-510
2	2001	89	-5	25	-445
3	2002	102	-4	15	-408
4	2003	114	-3	9	-342
5	2004	125	-2	4	-250
6	2005	119	-1	1	-119
7	2006	122	0	0	0
8	2007	134	1	1	134
9	2008	183	2	4	366
10	2009	239	3	9	717
11	2010	242	4	16	968
12	2011	245	5	25	1225
13	2012	251	6	36	1506
Total		2050	0	181	2842

Straight Line eqn $Y_c = a + bX$

Since $\sum x = 0$

$a = \sum Y/N = 2050/13 = 157.69$; $b = \sum XY/\sum x^2 = 2842/181 = 15.70$

Estimated literature in 2017 is when $X = 2017 - 2006 = 11$

$= 157.69 + 15.70 * 11 = 157.69 + 172.70 = 330.39$

Estimated literature in 2020 is $X = 2020 - 2006 = 14$

$= 157.69 + 15.70 * 14 = 157.69 + 219.80 = 377.49$

From the results of the calculations it is found that the future trend of Coffee Plant research output by joint authors may show up an increasing trend in the year 2017 and the same trend may continue over in 2020 also. Hence the conclusion is that the rate of growth is positive in Joint authorship productivity in Coffee Plant research.

Three Authored Publications – Trend Analysis

S.No	Year	Count (Y)	X	X ²	XY
1	2000	71	-6	36	-426
2	2001	78	-5	25	-390
3	2002	86	-4	15	-344
4	2003	85	-3	9	-255
5	2004	88	-2	4	-176
6	2005	86	-1	1	-86
7	2006	92	0	0	0
8	2007	102	1	1	102
9	2008	136	2	4	272
10	2009	141	3	9	423
11	2010	152	4	16	608
12	2011	159	5	25	795
13	2012	196	6	36	1176
Total		1472	0	181	1699

The above table reveals a Trend Analysis of the three authored publications in Coffee Plant research by applying the straight line equation formula.

Straight Line eqn $Y_c = a + bX$

Since $\sum x = 0$

$a = \sum Y/N = 1472/13 = 113.23$; $b = \sum XY/\sum x^2 = 1699/181 = 9.39$

Estimated literature in 2017 is when $X = 2017 - 2006 = 11$

$= 113.23 + 9.39 * 11 = 113.23 + 103.29 = \mathbf{216.52}$

From the results of the calculations it is found that the future trend of Coffee Plant research output by three authors may show up an increasing trend in the year 2017. Hence the conclusion is that the rate of growth is positive in three authorship productivity in Coffee Plant research.

Four Authored Publications – Trend Analysis

S.No	Year	Count (Y)	X	X ²	XY
1	2000	59	-6	36	-354
2	2001	64	-5	25	-320
3	2002	68	-4	15	-272
4	2003	75	-3	9	-225
5	2004	71	-2	4	-142
6	2005	78	-1	1	-78
7	2006	79	0	0	0
8	2007	84	1	1	84
9	2008	88	2	4	176
10	2009	83	3	9	249
11	2010	96	4	16	384
12	2011	94	5	25	470
13	2012	99	6	36	594
Total		1038	0	181	566

Straight Line eqn $Y_c = a + bX$

Since $\sum x = 0$

$a = \sum Y/N = 1038/13 = 79.85$; $b = \sum XY/\sum x^2 = 566/181 = 3.13$

Estimated literature in 2017 is when $X = 2017 - 2006 = 11$

$= 79.85 + 3.13 * 11 = 79.85 + 34.43 = \mathbf{114.28}$

Estimated literature in 2020 is when $X = 2020 - 2006 = 14$

$= 79.85 + 3.13 * 14 = 79.85 + 43.82 = \mathbf{123.67}$

From the results of the calculations it is inferred that the future trend of publications in Coffee Plant research output by four authors may witness an increasing trend in the year 2017 and may continue in the year 2020 also. Hence it may be concluded that there is a positive growth in Coffee Plant research output by four authored publications.

Five Authored Publications – Trend Analysis

S.No	Year	Count (Y)	X	X ²	XY
1	2000	42	-6	36	-252
2	2001	48	-5	25	-240
3	2002	52	-4	15	-208
4	2003	54	-3	9	-162
5	2004	58	-2	4	-116
6	2005	59	-1	1	-59
7	2006	59	0	0	0
8	2007	55	1	1	55
9	2008	57	2	4	114
10	2009	65	3	9	195
11	2010	61	4	16	244
12	2011	66	5	25	330
13	2012	75	6	36	450
Total		751	0	181	351

Straight Line eqn $Y_c = a + bX$

Since $\sum x = 0$

$a = \sum Y/N = 751/13 = 57.77$; $b = \sum XY/\sum x^2 = 351/181 = 1.94$

Estimated literature in 2017 is when $X = 2017 - 2006 = 11$

$$= 57.77 + 1.94 * 11 = 57.77 + 21.34 = \mathbf{79.11}$$

Estimated literature in 2020 is when $X = 2020 - 2006 = 14$

$$= 57.77 + 1.94 * 14 = 57.77 + 27.16 = \mathbf{84.93}$$

From the results of the calculations it is inferred that the future trend of publications in Coffee Plant research output by five authors may witness an increasing trend in the year 2017 and may continue in the year 2020 also. Hence it may be concluded that there is a positive growth in Coffee Plant research output by five authored publications.

Major Findings

- The year-wise global distribution of research productivity in Coffee Plant for a period of 13 years from 2000 to 2012.
- The total publication count is found to be 10553 and the maximum output occurred in the year 2012 numbering 1231 and this formed 11.66 per cent of the total output. The least count of the total output was in the year 2000 with 4.45 per cent.

It is inferred that the Coffee Plant oriented articles are slightly increased year by year.

- The relative strength of authorship pattern. It is found that, multiple authors formed 48.00 per cent of the total research output, while double authorship formed 19.43 per cent. Single authorship had a score of 32.57 per cent which was smaller in number when compared to the other types. Further it is found that multiple author ship was dominant.
- The analysis of the extent of collaboration of Coffee Plant research reveals the following facts.

Degree of collaboration had an initial value of 0.63 per cent in the years 2005 and 2006 and this increased to 0.71 in the year 2012.

- The research literature output in Coffee Plant during the period of coverage was found to be in 23 languages among which English was predominant with 92.988 per cent. Non-English contributions belonging to other 22 languages shared 7.012 per cent of the total output forming a meager number. Out of the 7.012 per cent of non-English literature, a majority was in European languages that included Portuguese, Spanish, German, French and Japanese. There was a single article in Arabic Language while there was not even a single one in Hindi.

Among the difference format of publications, Articles (82.40%) are well ahead of all other types of articles followed by Review (5.01%), Proceedings Paper (4.06%) and Meeting Abstract (3.67%). These categories constitute more than 82% of the articles.

Indian Contributions

- The types of institutions in India, where from the contributions originated. It is found that, 32.73 percent of the contributions were from Indian Universities, followed by 26.19 per cent from other research institutes and 10.18 percent of the contribution came from the Cent Food Technology Research Institute. Further it is found that the least of the contributions (0.73 percent) was from 6 Indian Research Centers.

published in India has been the items; Articles (86.91 percent) are well ahead of all other types of articles followed by Review (9.45 percent), Proceedings Paper (1.82 percent) and Editorial Material (0.74 percent). These categories constitute more than 87 percent of the articles.

- The article written by Kashyap, D.R and etal., published in the Bioresource Technology in the year 2001 got received the higher citation of 199.
- Among the 275 Research Areas in Coffee Plant in India, the Food Science Technology is contributing the highest score in 59 with the percent of 21.45. Also, secondly score the Biotechnology Applied Microbiology in 51 counts with the percent of 18.54.

Distribution of using words of Coffee Plant research literature output used in all the 13 years. In the word 'Coffee Plant' mostly used in 4874 times, and the total global citation are 43510 and scored in first. They next scored the word caffeine in 800 times forming 12968 total global citations.