

# Genetic Diversity Research Publication Output in India: A Scientometric Analysis

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**Abstract** - This paper attempts a scientometric analysis of literature in the field of genetic diversity in India over 5 years (2013-2017). A total of 1417 records and 5960 unique authors are identified. The study characterizes growth output, Authorship pattern, Collaboration pattern, Citation pattern, institutional status etc. Many of the publications have received worldwide attention of various researchers, policymakers, and planners. The number of papers was maximum in the year 2016. Average publication per year is 283. Multi-authored papers dominated over single authorship. The study was analysed by using HistCite software.

**Keywords:** Bibliometric, Scientometric, Authorship Pattern, Citation, Genetic Diversity

## I. INTRODUCTION

Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species. It is distinguished from genetic variability, which describes the tendency of genetic characteristics to vary.<sup>1</sup> It is defined as the variation in the amount of genetic information within and among individuals of a population, a species, an assemblage, or a community.<sup>2</sup> Each individual species possesses genes which are the source of its own unique features: In human beings, for example, the huge variety of people's faces reflects each person's genetic individuality.

## II. REVIEW OF LITERATURE

A quantitative description of the growth of climate change was presented by Stanhill (2001) has appeared in the abstracting journal of the American Meteorological Society.

Abstracts of the literature on climate change published before 1950 were taken from the extensive special bibliographies published in 1950. The cumulative number of publications abstracted by the end of 1997 was observed as 6734.<sup>3</sup> Kirti Joshi, Avinash Kshitij and K.C. Garg<sup>1</sup> examined the pattern of publication output, geographical distribution and highly cited papers of about 1 lakh publications of forest mycology from 1987-2008.<sup>4</sup> Pacitasso, Marco studied the temporal trends in the number of publications of forest health and tree diseases and the study revealed that there was a slow increase in the proportion of forest-related papers<sup>5</sup>. Weishu Liu et al studied developments in Biomass-based bioenergy research. They found that biomass publications are distributed in

some developed regions and emerging economies. The USA lead in the quantity of publication and collaboration links<sup>6</sup>. The study analyzed the research output of genetic diversity publication of Indian output.

## III. OBJECTIVES

1. To identify the year wise growth in the field of Genetic Diversity research.
2. To identify the Relative Growth Rate of Publication and doubling time.
3. To identify Authorship pattern and Degree of Collaboration.
4. To identify the Year-wise citation of Records.
5. To identify the Author wise analysis of Publication to find out the most prolific author.
6. To identify the journal wise analysis of records.
7. To identify the language wise and document type wise analysis.
8. To identify the most collaborating institution.

## IV. METHODOLOGY

The study was conducted by retrieving data from the Web of Science database on Genetic Diversity for the study period 2013 to 2017 June. The keywords used are 'Genetic Diversity AND India'. The data is analyzed using the HistCite software tool. Total of 1417 records was received and analyzed.

## V. DATA ANALYSIS AND INTERPRETATION

### A. Year Wise Distribution of Publications

TABLE I YEAR-WISE ANALYSIS OF THE OUTPUT

S. No.	Publication Year	Recs	Percent	TLCS	TGCS
1	2013	256	18.1	192	2157
2	2014	282	19.9	119	1772
3	2015	276	19.5	88	1164
4	2016	304	21.5	34	743
5	2017	299	21.1	9	207

\* (TLCS-Total Local Citation Score, TGCS-Total Global Citation Score)

Table I shows the year-wise analysis of documents in genetic diversity research in India from 2013 to 2017. Among the years 2016 ranked top with 304(21.5%) records; followed by 2017 with 299(21.1%) of records. The table and figure present an increasing trend in the growth of publication.

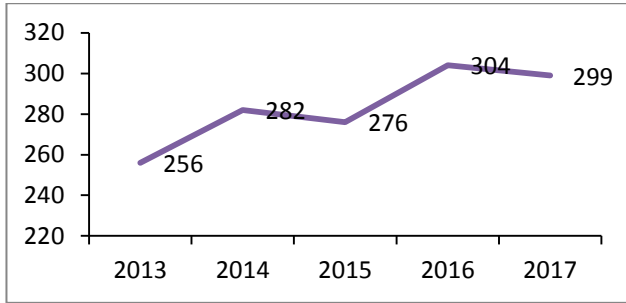


Fig. 1 The growth of publication (year-wise)

TABLE II YEAR-WISE RGR AND DOUBLING TIME

S. No.	Publication Year	Number of articles	cum	W1	W2	Rgr	Dt
1	2013	256	256	0.000	5.545	5.545	0.125
2	2014	282	538	5.545	6.288	0.743	0.933
3	2015	276	814	6.288	6.702	0.414	1.674
4	2016	304	1118	6.702	7.019	0.317	2.184
5	2017	299	1417	7.019	7.256	0.237	2.924

The table clearly presents that the Relative Growth Rate shows a decreasing trend; it was 5.545 in 2013 and decreased to 0.237 in 2017. The RGR was high in 2014. On the other hand, the doubling time of publications shows an increasing trend. It increased from 0.125 to 2.924 in 2017.

C. Authorship Pattern and Degree of Collaboration

Table III describes the authorship pattern in this subject. It clearly shows that multi-author research is prominent in this subject and the degree of collaboration is calculated using Subrahmanyam (1983) formula.

$$DC = Nm / (Ns + Nm)$$

Where Nm is number of multi-authored papers

Ns is number of single-authored papers

Here DC = 1396/1417 = 0.985

TABLE III AUTHORSHIP PATTERN

S. No.	Authorship Pattern	Records	%	DC
1	Single- Author	21	1.48	0.985
2	Multi- Author	1396	98.52	
	Total	1417	100	

From the above table it is understood that multi-authored papers dominated in this study. Among the 1417 papers,

B. Relative Growth Rate and Doubling Time

Relative Growth Rate is the increase in a number of articles or pages per unit of time. The mean RGR over a period of the interval can be calculated from the following equation.

$$R(1-2) = \frac{W2-W1}{T2-T1}$$

Where 1-2 is the mean relative growth rate over the specific period of interval. W1 is the log of the initial number of articles; logW2 is the log of the final number of articles after a specific period of interval and T2-T1 is the unit difference between the initial time and the final time,

$$\text{Doubling Time (Dt)} = 0.693/R$$

only 21 papers are produced by the single author, remaining 1396 papers are multi-authored.

Table IV presents the DC by year-wise. The degree of collaboration shows a constant number around 0.99.

TABLE IV DEGREE OF COLLABORATION YEAR-WISE

S. No.	Year	Ns	Nm	DC	Mean
1	2013	2	254	0.99	0.984
2	2014	6	276	0.98	
3	2015	5	271	0.98	
4	2016	5	299	0.98	
5	2017	3	296	0.99	
Total		21	1396		

1. Collaborative Index (CI) and Collaborative Coefficient (CC)

The Degree of collaboration is also analyzed by measures such as collaborative coefficient and Collaborative coefficient. Table V presents the Collaborative Index and Collaborative Coefficient.

The CI value is 5.66 in 2013 and it increased to 6.08 in 2017, also the CC value is 0.75 in 2013 and 0.74 in 2017.

TABLE V COLLABORATIVE INDEX AND COLLABORATIVE COEFFICIENT YEAR WISE

S. No.	Year	1	2	3	4	5 and Above	Total No. of Authors	Total No. of Articles	CI	CC
1	2013	2	16	33	46	162	1448	256	5.66	0.75
2	2014	6	25	34	57	160	1608	282	5.70	0.73
3	2015	5	16	25	53	176	1681	276	6.09	0.75
4	2016	5	16	36	37	198	1897	304	6.24	0.76
5	2017	3	31	39	45	181	1818	299	6.08	0.74

2. Author-Wise Ranking of Publications

Table VI shows the top 10 ranks of authors contributed in this subject and the Local Citation Score and Global

Citation Score they received. Kumar S contributed 62 articles to this subject area and got an LCS of 34 and GCS of 300. Kumar A came second with 32 articles, and the author got LCS of 8 and GCS of 105.

TABLE VI TOP 10 PROLIFIC AUTHORS

S. No.	Author	Recs	Percent	LCS	LCS/t	LCSx	GCS	GCS/t	LCR
1	Kumar S	62	4.4	34	8.37	17	300	82.72	21
2	Kumar A	32	2.3	8	2.33	4	105	36.57	11
3	Singh AK	29	2	16	4.02	6	159	41.48	12
4	Singh R	29	2	14	4.55	8	170	44.30	18
5	Kumar R	26	1.8	5	1.37	4	47	14.30	2
6	Singh S	26	1.8	20	5.12	14	82	23.88	5
7	Sharma R	24	1.7	7	1.70	3	77	25.85	7
8	Das A	19	1.3	14	3.88	2	83	21.05	19
9	Singh D	17	1.2	6	1.75	2	39	15.08	11
10	Singh M	17	1.2	8	1.75	3	63	16.58	4

D. Top 10 Journal-Wise Output of Renewable Biomass Research

The scientific literature in genetic diversity is spread over 489 different journals. The top 10 most productive journals

are visible in table VI. ‘PLOS ONE’ is the highly productive journal. It produced 84 records during the period of study (5.9%), its GCS is 737. Infection Genetics and Evolution produced 47 records and came in the second position with GCS of 302.

TABLE VII TOP 10 JOURNALS IN GENETIC DIVERSITY RESEARCH OUTPUT

S. No.	Journal	Recs	Percent	LCS	LCS/t	GCS	GCS/t	LCR
1	Plos One	84	5.9	0	0.00	737	203.25	26
2	Infection Genetics And Evolution	47	3.3	31	7.72	302	92.93	26
3	Indian Journal Of Agricultural Sciences	35	2.5	6	1.40	18	5.17	9
4	Indian Journal Of Biotechnology	29	2	4	0.98	13	3.22	6
5	Genetic Resources And Crop Evolution	25	1.8	16	4.22	86	23.13	5
6	Industrial Crops And Products	20	1.4	9	2.13	108	37.02	10
7	Mitochondrial Dna Part A	19	1.3	3	1.50	15	8.00	5
8	3 Biotech	17	1.2	9	2.53	33	12.92	17
9	Indian Journal Of Animal Sciences	17	1.2	4	1.03	26	6.20	5
10	Plant Genetic Resources-Characterization And Utilization	17	1.2	11	2.63	31	8.37	5

1. Top 10 Country-Wise Collaboration Output

Total 109 countries contributed to the genetic diversity research field during the period of study. Table VIII displays publication output of the top 10 countries

collaborated with India and their citation scores and h-index. The USA collaborated with India in 160 papers (h-index 19) and China (h-index 9) 71 papers. Australia and UK produced 52 records each.

TABLE VIII COUNTRY-WISE COLLABORATION OUTPUT

S. No.	Country	Recs	Percent	LCS	GCS	h-index
1	India	1074	75.8	384	3938	22
2	USA	160	11.3	47	1102	19
3	Peoples R China	71	5	14	327	9
4	Australia	52	3.7	5	559	15
5	UK	52	3.7	13	468	13
6	Brazil	34	2.4	8	208	7
7	Germany	34	2.4	6	245	8
8	Japan	33	2.3	12	341	8
9	Pakistan	31	2.2	5	180	8
10	France	30	2.1	34	258	10

### E. Top 10 Institution-Wise Collaboration Output

The topmost prolific institutions involved in genetic diversity research are displayed in table IX and fig. 2. Indian Agriculture Research Institute tops the list with 52

records (LCS 24, GCS 236). National Bureau of Plant Genetic Resources and the University of Delhi comes in second and third positions with 33(LCS 18, GCS 159) and 68 (LCS 11, GCS 153) records.

TABLE IX INSTITUTION-WISE COLLABORATION OUTPUT

S. No.	Institution	Recs	Percent	LCS	GCS
1	Indian Agriculture Research Institute	52	3.7	24	236
2	National Bureau of Plant Genetic Resources	33	2.3	18	159
3	University of Delhi	33	2.3	11	153
4	International Crops Research Institute for Semi-Arid Tropics	26	1.8	13	285
5	ICAR Research Complex	25	1.8	8	35
6	Banaras Hindu University	20	1.4	15	161
7	Punjab Agriculture University	19	1.3	5	45
8	CSIR	17	1.2	9	77
9	ICAR Natl Bureau of Plant Genetic Resources	17	1.2	0	28
10	Indian Council Agriculture Research	17	1.2	11	86

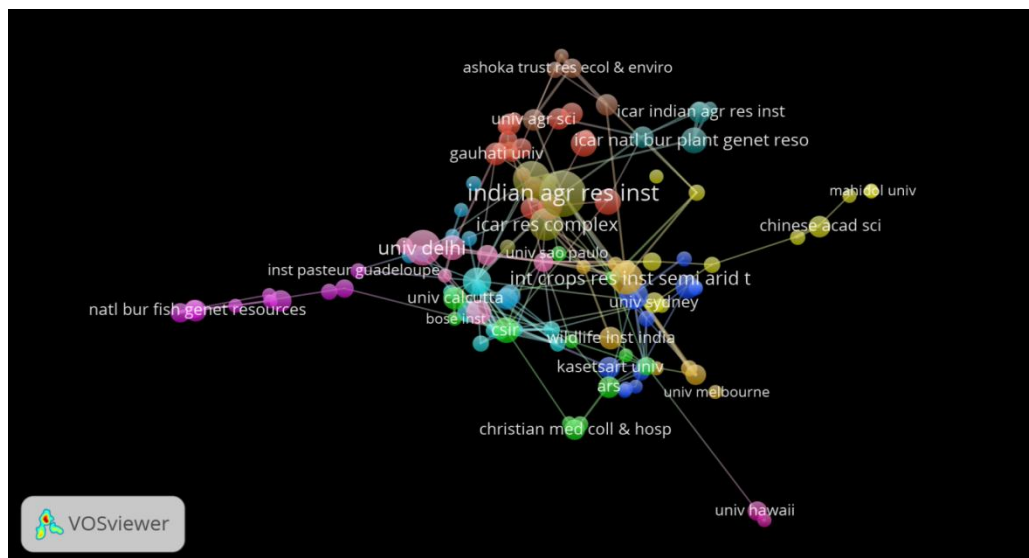


Fig. 2 Institution-wise Collaboration Output

**F. Language-Wise Distribution of Documents**

The English language dominates the language wise analysis of publications with 99.8% records (1414). Remaining 3 papers are in Portuguese and Spanish language.

TABLE X LANGUAGE-WISE DISTRIBUTION OF DOCUMENTS

S. No.	Language	Recs	Percent	LCS	GCS
1	English	1414	99.8	442	6038
2	Portuguese	2	0.1	0	5
3	Spanish	1	0.1	0	0

**G. Document Wise Research Output**

The study reveals that the 96% (1361) publications are in the form of articles, followed by the review (2.8%) and proceedings paper (0.3%).

TABLE XI DOCUMENT-TYPE WISE DISTRIBUTION OF DOCUMENTS

S. No.	Document Type	Recs	Percent	LCS	GCS
1	Article	1361	96	430	5647
2	Review	40	2.8	11	334
3	Letter	4	0.3	1	14
4	Article; Proceedings Paper	3	0.2	0	5
5	Editorial Material	3	0.2	0	9
6	Meeting Abstract	2	0.1	0	0
7	Review; Book Chapter	2	0.1	0	33
8	Article, Data Paper	1	0.1	0	0
9	Correction	1	0.1	0	1

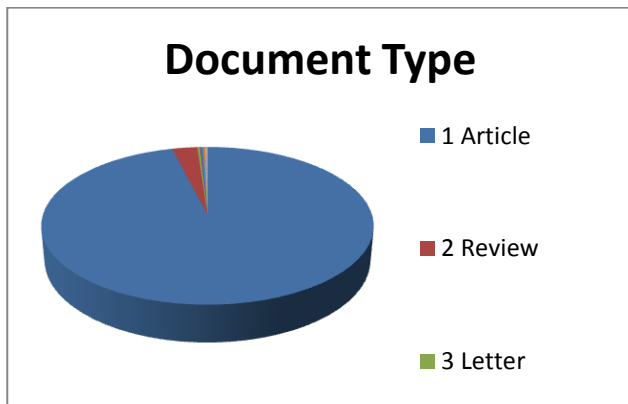


Fig. 3 Document-type wise analysis

**H. Citation Analysis**

Table XII displays the citations and h- index of top 10 authors in the genetic diversity research area. The most productive author Kumar S received 300 citations for his 62 papers and his h- the index is 8. Kumar A produced 32 records and has got 105 citations and his h-index is 6.

TABLE XII CITATION ANALYSIS OF TOP 10 AUTHORS

S. No.	Author	Recs	Citations Received	H-index
1	Kumar S	62	300	8
2	Kumar A	32	105	6
3	Singh AK	29	159	7
4	Singh R	29	170	7
5	Kumar R	26	47	3
6	Singh S	26	82	4
7	Sharma R	24	77	5
8	Das A	19	83	5
9	Singh D	17	39	3
10	Singh M	17	63	5

**VI. CONCLUSION**

The study reveals that steady growth was observed from 2013 to 2017 in this subject. Out of the 1417 records identified from India during the study period, the highest number of publications was recorded in 2016. The average number of publication per year was 283.4. The RGR shows a decreasing trend on the other hand Doubling Time shows an increasing trend. Multi-authored papers dominated the research output over single-authored. The USA collaborated with India most records. ‘PLOS ONE’ is identified as the core journal and IARI is the most prolific institution.

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