# Characteristics of Research Articles published by India in *Nature*: A Review (1989-2015)

**Shankar Reddy Kolle**
Assistant Librarian
University of Horticultural Sciences, Bagalkot,
Karnataka State, India
Email Id: stkolle@gmail.com

Abstract

*The Nature is one of the top journals in the world that publishes papers on science and technology (Multidisciplinary Sciences). The data related to articles contributed by India based authors in Nature published between 1989-2015 was collected from the Science Citation Expended Index of Web of Science. A total of 128 articles were contributed by Indian based authors with an average of 4.92 per year. The years 1998 and 2014 recorded highest articles (11) and majority of the top cited articles were collaborated by large number of authors belonging different intuitions situated around the world. The articles which has more number of co-authors and moderated number of references had received good number of citations. Three top most cited articles were belonging agriculture subject and two were from material science and health science respectively.*

Keywords

*Nature,* India, Articles, Citations, Scientometric
.

Electronic access

The journal is available at www.jalis.in

**Journal of Advances in Library and Information Science**
ISSN: 2277-2219 Vol.5. No.1. 2016. pp. 30-35

## INTRODUCTION

*Nature* is the world's most highly cited interdisciplinary science journal, according to the 2013 Journal Citation Reports Science Edition (Thomson Reuters, 2014). Its Impact Factor is 42.351. The journal was started in 4th November 1869. Nature is a weekly international journal publishing the finest peer-reviewed research in all fields of science and technology on the basis of its originality, importance, interdisciplinary interest, timeliness, accessibility, elegance and surprising conclusions. Nature also provides rapid, authoritative, insightful and arresting news and interpretation of topical and coming trends affecting science, scientists and the wider public (Nature Publishing Group, 2016).

Bibliometric analysis technique is general research tool has been extensively used to measure scientific performance of countries (Chuang and Ho 2015; Glánzel et al. 1995; Muthu. Chandrasekar, and Subbiah 2010), and on particular topic ( (Wormell, 2000)) and quality of journals and their article (Fu and Ho 2015; Lowry et al. 2004). Nature is one of the highly reputed journals and known for dissemination of quality research findings in the science and technology field. Publishing an article in the journal is big achievement and prestigious matter for the researchers. The journal follows rigorous editing and peer reviewed process. In this, sense, I come across a question of frequency and status of publication of articles by Indian authors, as the India is biggest democratic country and the research performance of country is essential for scientific progress in the country. The India has the one seventh of the populations in the world but after searching in Web of Science, it's true that meager number articles were found from the Indian based authors in the "*Nature*" Journal. Hence, in this paper, author had made an effort to review the characteristics of the research articles published in *Nature* in 1989-2015 with at least one co-author from India contained in address field. Analysis includes, analysis of different types of documents, annual publication of research articles, top ten most cited articles characteristics.

## OBJECTIVES

The main objectives of the study are to find out:

(i) year wise publication in the '*Nature'* from India;

(ii) types of publications and their citations and
(iii) top ten cited articles and their characteristics.

## METHODOLOGY

We collected the data of research articles indexed in *Science Citation Index- Expanded* (SCI-EXPANDED) database of Thomson Reuters. We searched the papers by assigning "*Nature*" in publication name and "India" in "Address" field and time span selected was from 1989-2015. A total of 327 documents were retrieved from the search as it has at least one author from India in address field of *WoS* database. The documents were identified as: Articles, Biographical-Item, Book Review, Correction, Addition Discussion, Editorial Material, Letter and Review. The articles were accounting for 39.1% (128) of total documents. As the other researchers followed (Li and Ho 2008), the articles were considered for analysis. The analysis included a year wise distribution of articles since 1989-2015, and their citations, Authors, references, contributing intuitions, page counts and an average citation counts, authors, contributing institutions, page counts and references per paper. The top ten most cited papers from India with were further analyzed to determine their bibliometric characteristics. The major limitation of the study is that the data limited to publications covered and cited in the *WoS* database.

## RESULTS AND DISCUSSION

### Publication outputs and citations

The journal publishes an average of plenty of articles per year. The table 1 gives the types of the documents published in *Nature* as a one of the co-author from India between 1989-2015. It's clear from the table that documents i. e., letters and articles were form major portion of the documents, accounting for 76.5% of the total publications. Only one document was categorized as review and that received 341 citations till end of 2015. Citations are indicators of documents quality and relevance in the current research trend (Li and Ho 2008). A total of 128 research articles were received 25845 citation counts with average citations per article of 201.91. Again one more interesting fact is that editorial materials were also received a considerable number of citations per document (24.86). Over all except to Correction, Addition (as they are not publications), an average of 85.28 per documents were found in the *Web of Science* database

**Table 1: Types of publications and citations**

| Type of Publication | Total publications | % | Total citations | Average citationsvper publication |
|---|---|---|---|---|
| Article | 128 | 39.1 | 25845 | 201.91 |
| Biographical-Item | 5 | 1.5 | 6 | 1.2 |
| Book Review | 17 | 5.2 | 7 | 0.41 |
| Correction, Addition | 1 | 0.3 | 0 | 0 |
| Discussion | 1 | 0.3 | 77 | 77 |
| Editorial Material | 45 | 13.8 | 1119 | 24.86 |
| Letter | 129 | 39.4 | 493 | 3.82 |
| Review | 1 | 0.3 | 341 | 341 |
| Total | 327 | 100 | 27888 | 85.28 |

### Year-wise distribution of articles and scientific descriptors

The table 2 provides details of year -wise distribution of articles published in *Nature* (1989-2015) and their scientific descriptors such as authors, citations, references, institutions and page counts (Chuang & Ho, 2015). A total of 128 articles were published in the journal between the years 1989-2015. The years 1998 and 2014 were recorded highest number of articles published in the *Nature* journal as one of the co-authors from India. For the years, 1994, 1997 and 2006 one article was published each. The articles published in 1999 had received highest rate of citation counts per article (540.80) and lowest in the year of 2015(3.17). As the articles need at least a decade to receive maximum citations (Glánzel et al., 1995). However, more number of authors was observed per publication and the citations per article also increased (Figure 1). The articles collaborated by more number of authors are tend to get more

number of citations and it corresponds to the quality of research work carried out by them. The articles which had received maximum citations tend to have moderate number of references.

**Table 2: Year wise distribution of articles and their scientific descriptors during 1989-2015**

| PY | TA | % | AU | TC | TR | CI | PC | AU/PA | TC/PA | TR/PA | CI/PA | PC/PA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1989 | 7 | 5.47 | 27 | 722 | 167 | 10 | 20 | 3.86 | 103.14 | 23.86 | 1.43 | 2.86 |
| 1990 | 5 | 3.91 | 16 | 662 | 103 | 3 | 13 | 3.20 | 132.40 | 20.60 | 0.60 | 2.60 |
| 1991 | 7 | 5.47 | 61 | 873 | 196 | 18 | 24 | 8.71 | 124.71 | 28.00 | 2.57 | 3.43 |
| 1992 | 4 | 3.13 | 13 | 235 | 75 | 1 | 11 | 3.25 | 58.75 | 18.75 | 0.25 | 2.75 |
| 1993 | 2 | 1.56 | 6 | 155 | 61 | 4 | 7 | 3.00 | 77.50 | 30.50 | 2.00 | 3.50 |
| 1994 | 1 | 0.78 | 3 | 26 | 28 | 1 | 3 | 3.00 | 26.00 | 28.00 | 1.00 | 3.00 |
| 1995 | 2 | 1.56 | 7 | 253 | 40 | 1 | 7 | 3.50 | 126.50 | 20.00 | 0.50 | 3.50 |
| 1996 | 3 | 2.34 | 20 | 1456 | 59 | 7 | 11 | 6.67 | 485.33 | 19.67 | 2.33 | 3.67 |
| 1997 | 1 | 0.78 | 5 | 131 | 30 | 4 | 4 | 5.00 | 131.00 | 30.00 | 4.00 | 4.00 |
| **1998** | **11** | **8.59** | **76** | **3493** | **325** | **43** | **41** | **6.91** | **317.55** | **29.55** | **3.91** | **3.73** |
| **1999** | **5** | **3.91** | **70** | **2704** | **114** | **38** | **16** | **14.00** | **540.80** | **22.80** | **7.60** | **3.20** |
| 2000 | 5 | 3.91 | 29 | 1030 | 131 | 14 | 21 | 5.80 | 206.00 | 26.20 | 2.80 | 4.20 |
| 2001 | 5 | 3.91 | 16 | 1122 | 102 | 12 | 18 | 3.20 | 224.40 | 20.40 | 2.40 | 3.60 |
| 2002 | 3 | 2.34 | 23 | 223 | 69 | 16 | 10 | 7.67 | 74.33 | 23.00 | 5.33 | 3.33 |
| 2003 | 3 | 2.34 | 18 | 1023 | 85 | 14 | 11 | 6.00 | 341.00 | 28.33 | 4.67 | 3.67 |
| 2004 | 6 | 4.69 | 405 | 1719 | 170 | 86 | 24 | 67.50 | 286.50 | 28.33 | 14.33 | 4.00 |
| 2005 | 7 | 5.47 | 382 | 2882 | 186 | 84 | 30 | 54.57 | 411.71 | 26.57 | 12.00 | 4.29 |
| 2006 | 1 | 0.78 | 5 | 147 | 31 | 1 | 4 | 5.00 | 147.00 | 31.00 | 1.00 | 4.00 |
| 2007 | 4 | 3.13 | 37 | 590 | 132 | 25 | 18 | 9.25 | 147.50 | 33.00 | 6.25 | 4.50 |
| 2008 | 5 | 3.91 | 331 | 599 | 165 | 110 | 25 | 66.20 | 119.80 | 33.00 | 22.00 | 5.00 |
| 2009 | 5 | 3.91 | 719 | 1788 | 191 | 111 | 28 | 143.80 | 357.60 | 38.20 | 22.20 | 5.60 |
| 2010 | 2 | 1.56 | 282 | 684 | 63 | 162 | 9 | 141.00 | 342.00 | 31.50 | 81.00 | 4.50 |
| 2011 | 6 | 4.69 | 839 | 1311 | 203 | 243 | 32 | 139.83 | 218.50 | 33.83 | 40.50 | 5.33 |
| 2012 | 6 | 4.69 | 705 | 1199 | 199 | 305 | 38 | 117.50 | 199.83 | 33.17 | 50.83 | 6.33 |
| 2013 | 5 | 3.91 | 57 | 244 | 196 | 21 | 25 | 11.40 | 48.80 | 39.20 | 4.20 | 5.00 |
| **2014** | **11** | **8.59** | **359** | **555** | **514** | **188** | **156** | **32.64** | **50.45** | **46.73** | **17.09** | **14.18** |
| 2015 | 6 | 4.69 | 464 | 19 | 229 | 218 | 72 | 77.33 | 3.17 | 38.17 | 36.33 | 12.00 |
| Total | 128 | 100 | 4975 | 25845 | 3864 | 1740 | 678 | 38.87 | 201.91 | 30.19 | 13.59 | 5.30 |

Note: PY, publication year, %, percent of 128, AU, total authors, TC, total citations, TR, total references, CI, total contributing institutions, PC, Page counts, AU/PA, TC/PA, TR/Pa, CI/PA, PC/PA=average authors, citations, references, institutions and page counts per article.

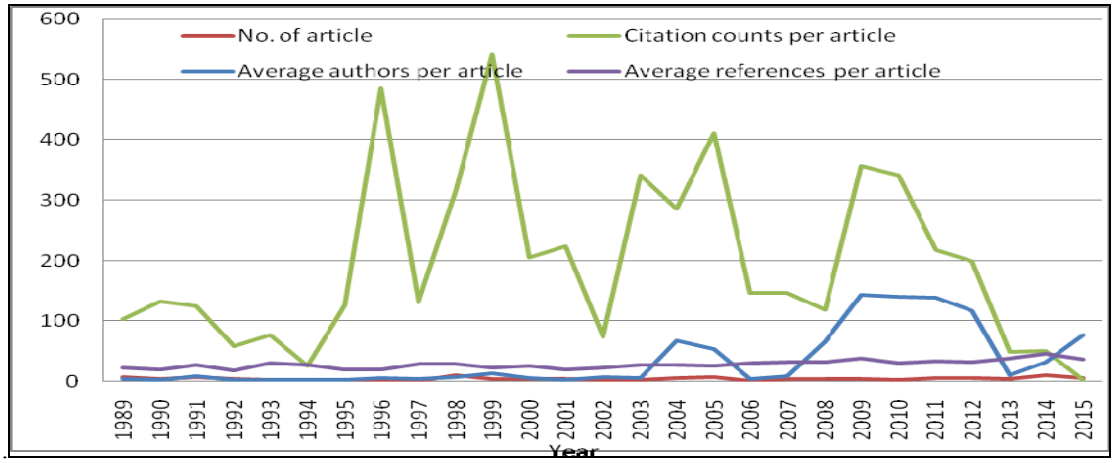



*Figure 1 Total articles with citations, authors, and references per article*

The page counts also kept increasing from 2.86 to 14.18. An average of 13.59 and 5.30 contributing intuitions and page counts were observed for the total articles. Again it is interesting to note that the articles which had more number of authors, contributing institutions and references were highly cited than of lesser one (Kostoff & Cummings, 2013). The first article published in the journal on Jan 1st 1989 was titled as "Proterozoic microfossils from manganese ore body, India" authored by Bandopadhyay, PC had received citations of 7 till end of the 2015. The author belongs to Geological survey India, Calcutta, India. Similarly, recently published article in the journal on 24th December 2015 was titled as "Dense magnetized plasma associated with a fast radio burst" co-authored by Masui et al. had received no citations. Again it can be noted from the analysis that the articles published with collaboration of western based authors and intuitions usually receive good number of citations than of only Indian based one (Barbosa & Schneck, 2015; Persson, 2010).

**Characteristics of top ten most cited articles in *Nature***

The table 3 gives the details of the top ten most frequently cited articles published in Nature as one of the co-authors from India between 1989-2015.

**Table 3:Top ten most cited articles and their characteristics published in *Nature* (1989-2015)**

| AU & PY | T/AU | TI | PY | TC | TC/PY | RP |
|---|---|---|---|---|---|---|
| (Matsumoto et al., 2005) | 260 | The map-based sequence of the rice genome | 2005 | 1706 | 155.9 | Sasaki, T (reprint author), Natl Inst Agrobiol Sci, Inst Soc Techno Innovat Agr Forestry & Fisheries, 2-1-2 Kannondai, Tsukuba, Ibaraki 3058602, Japan. |
| (Saji, Goswami, Vinayachandran, & Yamagata, 1999) | 4 | A dipole mode in the tropical Indian Ocean | 1999 | 1573 | 92.52 | Yamagata, T (reprint author), Inst Global Change Res, SEAVANS N7F, Minato Ku, 1-2-1 Shibaura, Tokyo 1056791, Japan. |
| (Ding, et al. 1996) | 9 | Spectroscopic evidence for a pseudogap in the normal state of underdoped high-T-c superconductors | 1996 | 1107 | 55.35 | Campuzano, JC (reprint author), Argonne Natl Lab, Div Mat Sci, 9700 S Cass Ave, Argonne, IL 60439 USA. |
| (Paterson et al., 2009) | 45 | The Sorghum bicolor genome and the diversification of grasses | 2009 | 957 | 136.71 | Paterson, AH (reprint author), Univ Georgia, Plant Genome Mapping Lab, Athens, GA 30602 USA. |
| (Varma & Mayor, 1998) | 2 | GPI-anchored proteins are organized in submicron domains at the cell surface | 1998 | 847 | 47.05 | Mayor, S (reprint author), Natl Ctr Biol Sci, TIFR Ctr, IISc Campus,POB 1234, Bangalore 560012, Karnataka, India. |
| (Norman et al., 1998) | 11 | Destruction of the Fermi surface underdoped high-T-c superconductors | 1998 | 760 | 42.22 | Campuzano, JC (reprint author), Argonne Natl Lab, Div Mat Sci, 9700 S Cass Ave, Argonne, IL 60439 USA. |
| (Bateson et al., 2004) | 16 | Developmental plasticity and human health | 2004 | 710 | 59.16 | Bateson, P (reprint author), Univ Cambridge, Subdept Anim Behav, High St, Cambridge CB3 8AA, England. |
| (Sastry, | 3 | Signatures of | 1998 | 654 | 36.33 | Debenedetti, PG (reprint author), Princeton |

| | | | | | | |
|---|---|---|---|---|---|---|
| Debenedetti, & Stillinger, 1998) | | distinct dynamical regimes in the energy landscape of a glass-forming liquid | | | | Univ, Dept Chem Engn, Princeton, NJ 08544 USA. |
| (Ramirez, Hayashi, Cava, Siddharthan, & Shastry, 1999) | 5 | Zero-point entropy in 'spin ice' | 1999 | 597 | 35.11 | Ramirez, AP (reprint author), Lucent Technol, Bell Labs, 600 Mt Ave, Murray Hill, NJ 07974 USA. |
| (Sato et al., 2012) | 321 | The tomato genome sequence provides insights into fleshy fruit evolution | 2012 | 585 | 146.25 | Sato, S (reprint author), Kazusa DNA Res Inst, 2-6-7 Kazusa Kamatari, Kisarazu, Chiba 2920818, Japan. |

Note: AU & PY, Publication year and Author name, T/AU, total authors, TI, title, R, References, TC, total citations.

Out of ten, five were contributed by large number of authors (Kostoff and Cummings 2013) and no article was contributed by single author. Except two (Sastry et al., 1998; Varma & Mayor, 1998), all remaining articles had either first author or corresponding author from Japan, USA and England. The first author and corresponding author were find prominent place in the authorship pattern (Chuang & Ho, 2015). Three articles that had highest average citations per year were co-authored by large number of authors ranged between 45 to 321 authors and related to breeding works of Rice, Sorghum and tomato respectively (Matsumoto et al., 2005; Paterson et al., 2009; Sato et al., 2012). The article titled as "The map-based sequence of the rice genome" were co authored by two Indian authors, Mukai, Y and Nagasaki, H and they belong to University of Delhi, Dept Plant Molecular Biology, New Delhi and Indian Agricultural Research Institute respectively. The article titled as "The Sorghum bicolor genome and the diversification of grasses" was co-authored by Hash, C. Thomas as Indian based author and he belongs to International Crops Research Institute for Semi Arid Tropical, Patancheru, Andhra Pradesh, India. Similarly, one more top cited article published in 2012 titled as "The tomato genome sequence provides insights into fleshy fruit evolution" were co authored by following authors from India i. e., Dixit, Rekha; Singh, Manju; Singh, Archana; Pal, Jitendra Kumar; Pandit, Awadhesh; Singh, Pradeep Kumar; Mahato, Ajay Kumar; Dogra, Vivek; Gaikwad, Kishor; Sharma, Tilak Raj; Mohapatra, Trilochan; Singh, Nagendra Kumar and All the authors were belong to Indian Agricultural Research Institute, NRC Plant Biotechnology, New Delhi 110012, India. Two articles were related to material science (Ding et al. 1996; Norman et al. 1998) and two belong to health science (Bateson et al., 2004; Varma & Mayor, 1998) and one belongs to environmental science (Saji et al., 1999) and remaining one belongs to physics (Ramirez et al., 1999).

## CONCLUSION

In this paper, author made effort to find out characteristics of articles published in the *Nature* journal as one of the co-authors from India. A total of 128 articles were published in the journal with average citations of 201.91 per article. The articles which top cited were co-authored by Japan, USA, England and France than alone India. The countries which are considered as pioneer in science research are all developed countries. Out of top ten most cited articles, three were belonging to Agriculture subject. The findings of this study indicate the India's poor performance in science research. India is biggest country in terms of population, which accounts for one seventh in the world. The study found that only 128 articles were contributed by Indian based author to *Nature* with an average of 4.92 articles per year for last 26 years. The research is basic for progress of any country and countryman. The poor performance in research from India may be due to non availability of sufficient funds and adequate facilities for the research and quality of education is one more serious concern in India. The politician and top bureaucrats need to understand the problems and take proactive role in addressing and formulation of policies, which provide sufficient funds and good environment for research in India.

## REFERENCES

[1]. Barbosa, F. G., & Schneck, F. (2015). Characteristics of the top-cited papers in species distribution predictive models.

*Ecological Modelling*, *313*, 77–83.

[2]. Bateson, P., Barker, D., Clutton-Brock, T., Deb, D., D'Udine, B., Foley, R. a, … Sultan, S. E. (2004). Developmental plasticity and human health. *Nature*, *430*(6998), 419–421.

[3]. Chuang, K., & Ho, Y. (2015). An evaluation based on highly cited publications in Taiwan An evaluation based on highly cited publications in Taiwan. *Current Science*, *108*(5), 933–941.

[4]. Ding, H. T. Yokoya, J. C. Campuzano, T. Takahashi, M. Randeria, M. R. Norman, T. Mochiku, K. K. J. G. (1996). Spectroscopic evidence for a pseudogap in the normal state of underdoped high-Tc superconductors. *Nature*, *382*, 51–54.

[5]. Fu, Hui-zhen, Y.-S. H. (2015). A bibliometric analysis of the Journal of Membrane Science ( 1976-2010 ). *The Electronic Library*, *33*(4), 698–713. http://doi.org/10.1108/EL-12-2013-0221

[6]. Glánzel, W., Rinia, E. J., & Brocken, M. G. M. (1995). A bibliometric study of highly cited European physics papers in the 80s. *Research Evaluation*, *5*(2), 113–122.

[7]. Kostoff, R. N., & Cummings, R. M. (2013). Highly cited literature of high-speed compressible flow research. *Aerospace Science and Technology*, *26*(1), 216–234.

[8]. Li YS, & Ho. Z. (2008). Use of citation per publication as an indicator to evaluate contingent valuation research. *Scientometrics*, *75*, 97–110.

[9]. Lowry, P. B., Romans, D., & Curtis, A. (2004). Global Journal Prestige and Supporting Disciplines : A Scientometric Study of Information Systems Journals. *Journal of the Association for Information Systems*, *5*(2), 29–77.

[10]. Matsumoto, T., Wu, J. Z., Kanamori, H., Katayose, Y., Fujisawa, M., Namiki, N., … Sugiura, M. (2005). The map-based sequence of the rice genome. *Nature*, *436*(7052), 793–800.

[11]. Muthu, M, G. Chandrasekar, Subbiah, A. (2010). Highly cited papers from India and China. *Current Science*, *99*(25), 738–749.

[12]. Nature Publishing Group. (2016). About.

[13]. Norman, M. R., Ding, H., Randeria, M., Campuzano, J. C., Yokoya, T., Takeuchi, T., … Hinks, D. G. (1998). Destruction of the Fermi surface in underdoped high-Tc superconductors. *Nature*, *392*(6672), 157–160.

[14]. Paterson, A. H., Bowers, J. E., Bruggmann, R., Dubchak, I., Grimwood, J., Gundlach, H., … Rokhsar, D. S. (2009). The Sorghum bicolor genome and the diversification of grasses. *Nature*, *457*(7229), 551–556.

[15]. Persson, O. (2010). Are highly cited papers more international? *Scientometrics*, *83*(2), 397–401.

[16]. Ramirez, A. P., Hayashi, A., Cava, R. J., Siddharthan, R., & Shastry, B. S. (1999). Zero-point entropy in /`spin ice/'. *Nature*, *399*, 333–335.

[17]. Saji, N. H., Goswami, B. N., Vinayachandran, P. N., & Yamagata, T. (1999). A dipole mode in the tropical Indian Ocean. *Nature*, *401*(6751), 360–363.

[18]. Sastry, S., Debenedetti, P. G., & Stillinger, F. H. (1998). Signatures of distinct dynamical regimes in the energy landscape of a glass-forming liquid. *Nature*, *393*(6685), 554–557.

[19]. Sato, S., Tabata, S., Hirakawa, H., Asamizu, E., Shirasawa, K., Isobe, S., … Klein Lankhorst, R. M. (2012). The tomato genome sequence provides insights into fleshy fruit evolution. *Nature*, *485*(7400), 635–641.

[20]. Varma, R., & Mayor, S. (1998). GPI-anchored proteins are organized in submicron domains at the cell surface. *Nature*, *394*(6695), 798–801.

[21]. Wormell, I. (2000). Biblimetric analysis of the Welfare Topic. *Scientometrics*. http://doi.org/10.1023/A:1005696722014