# An Analysis of Research Publications on Genetic Engineering

**Shehbaz Husain Naqvi***

*Assistant Professor, BLISc Course, Dr Zakir Husain Library, Jamia Millia Islamia, New Delhi-110025, INDIA.*

## ABSTRACT

A quantitative investigation of research papers published in Genetic Engineering from 2006 to 2015 was undertaken to capture the research trends in this field. The analysis applied the following parameters for capturing the trend- growth pattern of the literature, authorship pattern, ranking of the source journals, ranking of the countries, etc. The data was obtained from the SCOPUS database. The authorship analysis identified the top authors in this field, countries contributing to maximum publication, authors attracting highest quality measured through h index, highly influential journals. The contemporary research direction of this field can thus be identified to some extent by this study which can be useful input for policy.

**Keywords:** Genetic engineering, Research productivity, Authorship productivity, Scopus.

## INTRODUCTION

Genetic engineering is also known as genetic modification. It is a group of different technologies that are involved in changing the genetic structure of cells to produce new or improved organisms. Genetic engineering has various applications in different subject areas such as medical sciences, industrial research, agriculture, etc. Despite having very promising future, use of Genetic Engineering has some very serious concerns about human and animal health. Several organizations are having criticism of using it on various grounds like ethical, ecological and economic concerns. The legal and regulatory status of GM foods varies from country to country; some countries have totally banned their use while others have permitted with some restrictions.

Genetic Engineering is very promising field of study. In India, it is still in the development stage. Recently Government of India and other research institutions have made a significant increase in allocation of their grants and funding for research in genetic engineering. USA, UK, Europe, Canada is having good research output in genetic engineering.

### Review of literature

Balasubramani et al.[1] published an article on the growth of research on Genetic Engineering during 1974–2013. In their study 165984 records were retrieved. Common bibliometric analysis like year wise publication, bibliographic form of documents, area of research, name of source journals and important research institutions were studied. Mareeswari et al.[3] presents a Scientometric study of Genetic Engineering, the records published during the year 1989 to 2013 in the field of Genetic Engineering in the MEDLINE data which are covered in the PubMed. It was found that from 1989 onwards there is an increase in research output on Genetic Engineering with few exceptions. Mareeswari et al.[4] presented the growth trend in Genetic Engineering published from 1989 to 2013. The data was collected from MEDLINE for the period 1989–2013. The analysis of RGR and Dt when calculated year–wise in terms of number of publications and number of pages shows that RGR and Dt in Genetic Engineering for Indian output has shown non–continuous values throughout the study period.

Garg et al.[2] in their study on Indian literature on genetics and heredity show the highest output in the field of molecular genetics. Madras University has highest impact papers while Indian Veterinary Research Institute has the lowest impact papers.

### Objectives of the study

The objectives of the present study are as follows

- To study the growth of Genetic Engineering literature.

**Table 1: Growth of literature.**

| Year (Y) | Publications (P) | Cumulative Publications (CP) | Log of P | Log of CP | Annual Growth Rate (AGR) | Relative Growth Rate (RGR) | Doubling Time (Dt) |
|---|---|---|---|---|---|---|---|
| 2006 | 4438 | 4438 | 0.00 | ----- | ------ | ------ | ------ |
| 2007 | 3341 | 7779 | 8.11 | 8.96 | -24.72 | 0.56 | 1.23 |
| 2008 | 2659 | 10438 | 7.89 | 9.25 | -20.41 | 0.29 | 2.36 |
| 2009 | 2693 | 13131 | 7.90 | 9.48 | 1.28 | 0.23 | 3.02 |
| 2010 | 2625 | 15756 | 7.87 | 9.66 | -2.53 | 0.18 | 3.80 |
| 2011 | 2745 | 18501 | 7.92 | 9.83 | 4.57 | 0.16 | 4.31 |
| 2012 | 3019 | 21520 | 8.01 | 9.98 | 9.98 | 0.15 | 4.58 |
| 2013 | 3147 | 24667 | 8.05 | 10.11 | 4.24 | 0.14 | 5.08 |
| 2014 | 2968 | 27635 | 8.00 | 10.23 | -5.69 | 0.11 | 6.10 |
| 2015 | 2782 | 30417 | 7.93 | 10.32 | -6.27 | 0.10 | 7.23 |

- To identify the authors' productivity pattern in the said field.

- To examine the main journals in the field of Genetic Engineering.

- To know top literature producing countries and institutions on Genetic Engineering.

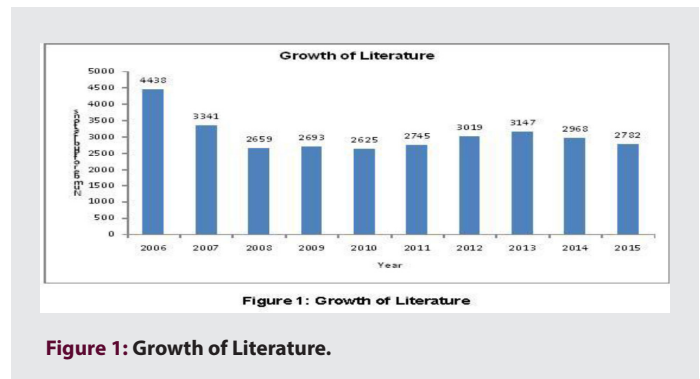- To find out the main subjects in which research on Genetic Engineering is published.

## METHODOLOGY

SCOPUS is internationally very well-known multidisciplinary database. It covers about 15,000 international peer reviewed journals in the field of Science and Technology. The data was collected from the SCOPUS database using "Genetic Engineering" as the keyword, appearing in "Article Title/Abstract/Keywords" for the period of 2006-2015. The type of the document selected is "Journal Article". Journals Articles were selected because the publications appearing in research journals are more reliable and authentic information source for researchers. Total numbers of records retrieved and analyzed by using MS–Excel were 30417.

## RESULTS AND DISCUSSIONS

### Growth of Literature

Table 1 shows that during 2006 to 2015, total of 30417 publications in the form of Journal articles were published in Genetic Engineering. The highest number of output was 4438 in 2006. The lowest numbers of publications, i.e. 2625 were published in 2010. The average number of publications published per year was 3041.7. The Table 1 also gives the annual growth rate of the total output produced in Genetic Engineering literature calculated year wise. It can be seen



Figure 1: Growth of Literature

**Figure 1: Growth of Literature.**

from the Table that the growth during the study period is not constant. . It is also shown in graphical form in Figure 1.

The AGR of –24.72 was lowest in 2006 and highest in 2012 with value of 9.98.

Similarly Table 1 reveals that Relative Growth Rate (RGR) has decreased from 0.56 in 2007 to 0.10 in the year 2015. The Doubling time (Dt) however has increased from 1.23 in year 2007 to 7.23 in the year 2015.

### Ranking of Countries

USA has contributed 10464 publications (34.40%). China comes next in terms of total output to the Genetic Engineering literature during the period of study. It has contributed a total of 4863 (15.99%) publications. These two countries together have produced almost fifty percent (50.39%) of the total Genetic Engineering literature output

### Authors' productivity pattern

Authors' productivity is based on their contributions in the field of Genetic Engineering. Total 29852 unique authors were found in the analysis. Rank one is occupied by Kondo, A. who has 62 publications, followed by Keasling, J.D. with 48

publications, Lee, S.Y. has 44 publications, Nielsen, J. contributed 42 publications, Fussenegger, M. has 39 publications, and Rosenberg, S.A. published 39 papers. When these authors are analyzed according to their country, then USA holds top position with 10 authors from it, followed by South Korea with 02 authors and Germany, Japan, Sweden, and Switzerland with 01 author each. Rosenberg, S.A. has published 39 papers but has highest h-index of 175. He is working in the field since 1961 and is senior-most of these top prolific authors.

## Ranking of source journals

The source journals are ranked based on the number of articles contributed. There were 3858 total unique journals in the study. Journal of Biological Chemistry is ranked one. It has contributed 1140 (3.75%) papers. It was followed by Applied and Environmental Microbiology with 846 (2.78%), PLOS One with 795 (2.61%) publications, Applied Microbiology and Biotechnology has 717 (2.36%) publications and Theoretical and Applied Genetics with 542 (1.78%). If the country of publication of these top 10 journals is seen it can be said that UK and USA are front runners in publishing high impact journals in Genetic Engineering, both have 05 journals each. Rest 05 journals are published from Germany (03) and Netherlands (02).

## Ranking of Institutions

Massachusetts Institute of Technology is the highest producer with 325 articles (1.07%) followed by Harvard Medical School with 317 (1.04%) publications and Chinese Academy of Sciences with 293 (0.96%).

## Main subject areas

It was found from the analysis that Genetic Engineering is a multi-disciplinary subject. Journals of almost all major subject areas are publishing research on Genetic Engineering. The top five subject areas on the basis of number of publications are Biochemistry, Genetics and Molecular Biology (17841), Medicine (7773), Immunology and Microbiology (6582), Agricultural and Biological Sciences (6383), and Engineering (4382).

## CONCLUSION

A study of literature published from 2006 to 2015 retrieved the total 30417 number of records. The growth trend of the literature was not constant throughout the study period. It has highest output in 2006 and lowest in 2010. The authorship analysis found that Kondu, A. is most prolific author and contributed the highest number of publications, i.e. 62 papers. Although Rosenberg, S.A. has published only 39 papers but

has highest h-index of 175. He is working in the field since 1961 and is senior-most of these top prolific authors. The first three highly productive journals are: Journal of Biological Chemistry with 1140 (3.75%) publications, Applied and Environmental Microbiology contributed 846 (2.78%), and PLoS One published 795 papers (2.61%). These top three ranking journals are published from USA. USA HAS contributed 10464 articles on Genetic Engineering literature. Massachusetts Institute of Technology (USA) is top literature producing institution with 325 publications. Analysis of sub subject categories of output shows that Genetic Engineering is a multi-disciplinary subject. Journals of almost all major subjects have published literature on it.

Scientometrics analysis of a subject field can help in identifying the country research status. It can be seen whether it is conducting more or less research compared to other countries. Through this analysis one can found subject areas in which research trend is high and the areas where research trend is low; and subject areas where no significant change in research is seen world-wide.

If a country is lagging in research output it means that the country has not picked new developments in the subject area and it needs some efforts to start devoting more these subject areas so that it can achieve benefits from research output of these areas, as the world is gaining.

## ACKNOWLEDEGEMEMNT

## CONFLICT OF INTEREST

There is no Conflict of Interest in my study.

## ABBREVIATIONS USED

None is related to my paper.

## SUMMARY

None is related to my paper.

## REFERENCES

1. Balasubramani C, Sathak Mohamed, Gopalakrishnan S, Gnanasekaran D. Growth of research output in Genetic Engineering: A Scientometrics Study. *Journal of Advances in Library and Information Science.* 2014;3(3):179-85.

2. Garg KC *et al.* Scientific profile of genetics and heredity research in India. *Annals of Library and Information studies.* 2010;57(3):196-206.

3. Mareeswari A, Vinayagamoorthy P, Ramakrishnan J and Shanthi J. Scientometric analysis of literature on Genetic Engineering (1989-2013). Indian Journal of Information Sources and Services. 2014;4(2):26-37.

4. Mareeswari A, Vinayagamoorthy P, Ramakrishnan J and Shanthi J. Trends in the growth of literature on Genetic Engineering (1989-2013). Asian Journal of Information Science and Technology. 2014;4(2):18-26.