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Bibliometric Analysis of Medicinal and Aromatic Plants Research Output

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Abstract:

Bibliometrics, as a tool for effective evaluation of research performance at various levels, has been adopted for the analysis of the research output in Medicinal and Aromatic plants with special focus on the authorship from India. The study covers a period of five years from 2008 to 2012 with records drawn from the Web of science. Indian authors are found to have performed better in their global citation score their Indian scores.

Keywords: Bibliometric analysis, Medicinal Aromatic plants, Research Performance.

Introduction

In science communication, the written information ('codified knowledge') has an objective existence yielding a high potential for study, research and further for citing in research publications. Measures of knowledge-production, transfer and utilization can be derived for scientific analysis from the publications in which scientific knowledge is embodied. These publications are representations of intellectual contributions to research in topics in subjects or any of their sub-fields. Such research publications appearing in journals of national and international origin get indexed in periodicals databases offering integrated information services.

Bibliometrics

A major change for the development of quantitative analysis of academic publishing was the initiative of the Institute for Scientific Information (ISI, now Thomson Reuter) citation index database, which began functioning in 1962 (Thackray 2000, Garfield, 2000), (Garfield 1979) together with associated post-war sociological theory allowing it to be used to assess the impact of scientific work (Merton 1973). Since then there has been a continuous increase in the computing power available in academic and research institutions that promote increasing numbers of bibliometric analyses possible. A majority of the academic research community working in various fields publish their major research

findings in open international scientific and technical journals. In their publications researchers usually cite works that influence them by including bibliographic profile of the cited source documents relevant to their study. In documenting the citations in research publications, every researcher follows a specific standardized style and leaves a paper trail of his/her scientific activities, research topics, collaborative linkages, and utilization of external scientific sources.

Citations serve as informants. Innumerable articles, notes, letters and reviews that are published regularly in periodicals – and millions of citations between the periodical publications - provide a way of tapping into knowledge communication and dissemination processes in science. They provide empirical data on research capacities and scientific activity of knowledge producing entities which become the pulp for research analysis in bibliometrics which 'encompasses the measurement of 'properties of documents, and of document-related processes'. (Bargman and Furner 2002)

The present study is a bibliometric analysis of Medicinal and Aromatic Plants research output as found indexed in the *Web of Science* – an online database of international research output in Science, Technology, Humanities and Social Sciences. This study covered a period of five years spanned between 2008 and 2012.

Medicinal and Aromatic Plants Research

Medicinal and Aromatic Plants (MAP) are the local heritage with global importance. World is endowed with a rich wealth of medicinal plants. Herbs have always been the principal form of medicine in India and presently they are becoming popular throughout the developed world, as people strive to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in concert with the body's own defenses. People all over the world including Europe, America and Australia are consulting trained herbal professionals and have been using the plant medicines. Medicinal plants also play an important role in the lives of rural people, particularly in remote parts of developing countries with few health facilities. It is estimated that around 70,000 plant species, from lichens to taller trees, have been used at one time or another for medicinal purposes. The herbs provide the starting material for the isolation or synthesis of conventional drugs. In Ayurveda about 2,000 plant species are considered to have medicinal value, while the Chinese pharmacopoeia lists over 5,700 traditional medicines, most of which are of plant origin. About 500 herbs are still employed within conventional medicine, although whole plants are rarely used.

Review of Literature

K.P.Khalsa (2007) provides an overview of Ayurveda . He discussed the value of the Ayurveda, the indigenous holistic healing system of India, is a

holistic approach to health and lifestyle management that incorporates diet, exercise, life activity routines, psychotherapeutic practices, massage and botanical medicine. Ayurveda focuses on prevention, applying techniques of self-care to restore health balance quickly and effectively.

Gian Singh, Moin Ahmad and Mohammad Nazim (2008) undertook a bibliometric analysis of scientific output of the plant *Embelia ribes* collecting a total of 332 articles from the Pub Med, The searches were restricted to published articles and contain the terms *Embelia ribes* and *Vidanga*. The various analyses focus on growth of literature, authorship pattern, most prolific authors, core journals of the subject, most productive institutes and countries.

Thirumagal (2012) studied the research performance in stem cell research covering a period of 10 years from 1999 to 2008 with a total of 54,373 publications drawn from MEDLINE database. The study revealed that USA ranked atop the list with a maximum number of contributions followed by United Kingdom and Netherlands as second and third positions respectively. Moreover, it was found that 88.52% of total output was published in English language, followed by Chinese 2.86% and Japanese 0.94%. There was a decrease in Relative Growth Rate. It was found that a maximum number of contributions (1908) were published in the journal 'Blood. Among the developing countries, India contributes substantially in Stem Cell Research

Need for the Study

Medicinal and Aromatic plants play a vital role as remedies for many of the diseases despite advancements in allopathic medicines among which many contains the organic plant extracts. For example, *Phyllanthus niruri* forms the base in Liv 52, the only medicine for jaundice. Though oriental nations have been traditionally practicing naturopathy, today even western nations have been showing interest in the medicinal and aromatic plants related research. India is acclaimed to be one of the major countries both in producing Medicinal and Aromatic plants and putting them to medical practice. A periodical study is required to track the growth and decline of the Medicinal and Aromatic plants research.

Limitations

The study is confined to literature from 2008 to 2012 drawn from the Web of Science.

Objectives of the Study

Regarding the analysis of Medicinal and Aromatic plants at the global level with specific focus on the Indian authors and institutions, the objectives of this study include

- (i) To measure the quantum of research productivity
- (ii) Study the growth rate of research literature productivity
- (iii) Study the language distribution of the publications
- (iv) Identify the highly productive journals
- (v) To identify the prolific authors from India
- (vi) Research literature output performance of Institutions from India

Methodology

The data required for the bibliometric study of the MAP research literature output were retrieved from the Web of Science for the period of five years spanned between 2008 and 2012 using the subject heading Medicinal and Aromatic Plants tagged with the required individual year numbers. Selective statistical principles have been applied other than bibliometric identification of prolific authors and institutions from India and core journals.

Table 1. MAP Research literature : Annual output

S.No.	Publication Year	Recs	Percentage
1	2008	71	11.51
2	2009	99	16.05
3	2010	112	18.15
4	2011	172	27.87
5	2012	163	26.42
	Total	617	100.00

Table 1 reveals the annual research literature output in the field of Medicinal and Aromatic Plants from a global perspective. From the table it is found that, for the period of five years, there was a total of 617 publications as indexed in the Web of Science. Among the annual performance of research output, the year 2011 recorded the highest output with 172 publications followed by the year 2012 with 163 publications. The year 2010 had 112 publications. The least of the publications count among the years under study was in 2008 with 71 publications. Further it is found that the annual output of published records in MAP research maintaining a steady growth except that of 2012 where there was a fall in publications output.

Table 2. Types of documents in MAP research output

S.No	Type of document	Records
1	Article	541
2	Review	62
3	Article; Proceedings Paper	7
4	Meeting Abstract	5
5	Correction	1
6	Review; Book Chapter	1
	TOTAL	617

Table 2 describes about the type of documents found in the field of Medicinal and Aromatic Plants research output drawn from the Web of Science online periodicals database. During the study period under coverage, there was a sum total of 617 items of records of which 541 were journal articles, 62 reviews, 7 proceedings paper, 5 meeting abstracts, one book chapter and one correction. It is found that a majority of the records belonged to the category of journal articles followed by reviews.

Table 3. Language of the Publications

S.No.	Language of the Publications	Number of Records
1	English	614
2	German	1
3	Portuguese	1
4	Spanish	1
	TOTAL	617

With regard to the language of the publications, from table 3, it is found that the publications were in four languages of which 614 were in English followed by one each from the German, Portuguese and Spanish. The lingua franca of the scholars in Medicinal Aromatic Plants was found to be predominantly English while records in the other languages were negligible.

Table 4. Prolific Authors from India

S.No.	Name of Author	Recs	Total Local Ciation Score	Total Global Citation Score
1	Kumar A	20	19	103
2	Rahuman AA	13	21	147
3	Bagavan A	11	20	132
4	Ignacimuthu S	11	22	113
5	Kamaraj C	11	20	133
6	Elango G	10	16	104
7	Zahir AA	9	15	91
8	Mishra A	8	7	46
9	Singh A	8	5	77
10	Kovendan K	7	15	74
11	Kumar M	7	1	12
12	Murugan K	7	15	74
13	Sharma A	7	1	15
14	Gond SK	6	7	44
15	Kharwar RN	6	7	44
16	Namsa ND	6	12	37
17	Reddy CS	6	5	26
18	Das S	5	6	34
19	Kumar S	5	1	26
20	Samant SS	5	2	6

A total of 1884 authors have participated in a total of 617 publications. Indian authors have been ranked according to the number of publications. From the table it is found that, in the context of number of publications, from India, the most prolific author is Kumar A with a record of 20 followed by Rahman A., with 13 articles to his score. Three authors Bagavan, A Ignasimuthu S. and Kamaraj C with 11 articles to each of their individual credit. In the context of total local

citation score, Ignacimuthu S, comes first with a score of 22 citations followed by Rahman AA with a score 21 citations to his credit. Third comes Bagavan A and Kamaraj C with a score of 20 local citations to their credit.

In the context of total global citation score, Rahman AA comes first with a score of 147 to his credit followed by Kamaraj C with a score of 133 and third in the ranking order is Bagavan A with a global score of 132. Further it is found that, eventhough Ignacimuthu S. stands first regarding total local citation score, his score is not impressive in the context of total global citation score. Anyhow, the study reveals that Indian authors dominate the prolific authors list.

Table 5. Core Journals

S.No.	Name of the Journal	Records
1	JOURNAL OF ETHNOPHARMACOLOGY	64
2	INDIAN JOURNAL OF TRADITIONAL KNOWLEDGE	53
3	JOURNAL OF MEDICINAL PLANTS RESEARCH	42
4	PARASITOLOGY RESEARCH	20
5	AFRICAN JOURNAL OF BIOTECHNOLOGY	16
6	PHARMACEUTICAL BIOLOGY	13
7	GENETIC RESOURCES AND CROP EVOLUTION	9
8	JOURNAL OF ETHNOBIOLOGY AND ETHNOMEDICINE	9
9	FITOTERAPIA	8
10	JOURNAL OF PURE AND APPLIED MICROBIOLOGY	8
11	AFRICAN JOURNAL OF TRADITIONAL COMPLEMENTARY AND ALTERNATIVE MEDICINES	7
12	CURRENT SCIENCE	7
13	ENVIRONMENTAL MONITORING AND ASSESSMENT	7
14	FOOD RESEARCH INTERNATIONAL	7
15	INTERNATIONAL JOURNAL OF PHARMACOLOGY	7

From the table it is found that *Journal of Ethnopharmacology* stands first with a record of 64 publications followed by *Indian Journal of Traditional Knowledge* with 53 publications. *Journal of Medicinal Plants Res* ranks third with 42 publications. *Current Science*, the official organ of the Indian Institute of Science, Bangalore is found in the 12 rank.

Table 6. Research literature output performance of Institutions from India

S.No.	Name of the Institution	Records
1	GB Pant Inst Himalayan Environm & Dev	17
2	Loyola Coll	15
3	C Abdul Hakeem Coll	14
4	Bharathiar Univ	13
5	CSIR	13
6	Univ Rajasthan	11
7	King Saud Univ	10
8	Annamalai Univ	9
9	Banaras Hindu Univ	9
10	NE Hill Univ	9
11	HNB Garhwal Univ	8
12	Kuvempu Univ	8
13	Tezpur Univ	8
14	Mizoram Univ	7
15	Univ Delhi	7
16	Bot Survey India	6
17	Rajiv Gandhi Univ	6
18	Amity Univ	5
19	Dibrugarh Univ	5
20	Indian Inst Forest Management	5

21	Manipur Univ	5
22	Sri Krishnadevaraya Univ	5
23	Univ Hyderabad	5
24	Alagappa Univ	4
25	Aligarh Muslim Univ	4
26	Assam Univ	4
27	Directorate Med & Aromat Plants Res	4
28	Father Muller Med Coll	4
29	Indian Inst Integrat Med	4
30	Indian Inst Sci	4

GB Pant Inst Himalayan Environm & Dev ranks first among the Indian Institutions engaged in MAP research, Loyala college from Chennai, Tamil nadu ranks second at the all India level. Indian Institute of Science ranks 30th among the Indian institutions.

Summary of Findings

In total a sum of 617 publications were found to have been published by a total of 1884 authors from across the globe. In total, 697 institutions have participated in the global contribution to the MAP research literature. Though the overall performance of India as a nation is impressive with good number of publications, the performance of individual institutions could have been better.

Conclusion

Bibliometric studies continue to facilitate the evaluation of research performance of subjects and their fields, individual nations and institutions besides authors in different perspectives. The results of the present study reveals the fact that regarding the Medicinal and Aromatics Plants research output, India with its vast botanical resources and research manpower secured higher global citation scores than their local citation scores thereby proving that publications in Medicinal and Aromatic plants research from India enjoy a higher quality at the international appreciation.

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