

Journal of Natural Rubber Research 1987-1996 : A ten-year bibliometric study

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The *Journal of Natural Rubber Research*, published by the Rubber Research Institute of Malaysia since 1929, has played a key role in the dissemination of natural rubber information all over the world. This paper analyses the authorship pattern, the range and frequency of references cited, the extent of acknowledgement and appendix or appendices being included in research articles of natural rubber, the types of collaborative research in natural rubber and the international collaboration scenario as portrayed in the Journal. Results indicated that the trend is towards multi-authorship and a high degree of collaboration between natural rubber researchers.

Introduction

Journal of Natural Rubber Research, a quarterly international scholarly journal is published by the Rubber Research Institute of Malaysia (RRIM), "the largest organisation of its kind in the world devoted to research and development concerning natural rubber" (Soosai & Kaw, 1975). The Journal publishes results of research and authoritative reviews on all aspects of natural rubber, which are, research oriented, original and unpublished. The Journal publishes original research articles on any of the following topics: genetics, breeding and selection; tissue culture and vegetative propagation; anatomy and physiology; exploitation; tapping systems and stimulation; agro-

economic practices and management; nutrition and fertiliser usage; soils; classification, chemistry, micro-biology, use and management; diseases and pests; economics of cultivation, production and consumption and marketing; mechanisation; biochemistry and bio-technology; chemistry and physics of natural rubber; technology of dry rubber and latex; natural rubber processing and presentation, product manufacture, end-uses and natural rubber industrialisation; tyres; NR and SR blends; and effluent treatment and utilisation. Since 1929 when it was first published, both its Editorial Board and Editorial Committee have been responsible for the management of the Journal. As a journal of international repute, a distinguished panel of consult-

ants, both local and foreign, is serving it as either a member of the Editorial Board or the Editorial Committee. Moreover, the articles of the Journals are also refereed by many of the Institute's eminent and respected referees who are specialists in their very own fields. Apart from discussing the scientific work of the Institute, it has since 1964 published relevant contributions from authors outside the Institute. It also contained reviews on books on natural rubber. Post-graduate theses of RRIM staff are also summarised in the Journal (RRIM House-style, 1983).

From its humble beginning in 1929, it has not remained static but undergone considerable changes for the better. The Journal was initially known as *Quarterly Journal of Rubber Research Institute of Malaya*. Following a decision of the Board, the title of the Journal was changed to *Journal of the Rubber Research Institute of Malaya (JRRIM)* in 1931 to include "the results of investigations carried out by members of the staff or articles containing the results of investigations specially contributed and approved by the Editorial Committee" (Editorial, *JRRIM*). With this change of name and policy, the number of issues published per year varied depending on the availability of materials for inclusion in the Journal. However, it was envisaged that "the issues to be published would be at quarterly intervals, even if each number is reduced in size and contains a smaller number of contributions" (Editorial, *JRRIM*). From 1931, the Institute continued to publish its journal without fail until the Japanese occupation of Malaya in September 1945. After the War, the next issue of the Journal was published in August 1947 as Volume 12, No. 262. In 1957, beginning with Volume

15, Part 1, a brief abstract was started to be given in all articles published in the Journal. "The purpose of the abstract is to indicate the contents and the scope of the paper without summarising or giving results, so that the reader may decide whether or not to peruse the paper at length" (Foreward *JRRIM*). Later, the Journal was named the *Journal of the Rubber Research Institute of Malaysia* in 1974 following the formation of Malaysia in 1963. Then, a volume of the Journal had five parts covered in two years. Later on, a volume had three parts per year. From 1986 till today, the Journal is being published with the present name, *Journal of Natural Rubber Research*, as a quarterly in March, June, September and December each year. One special feature of the Journal is to award the best paper contributed per volume which carries a cash prize of RM1000.00 and a certificate. This is one of the very few learned journals, which give recognition to scientific writings in Malaysia.

In terms of visibility, the Journal is currently being indexed by *CAB Abstracts* (Zainab Awang Ngah, 1997). Apart from that, each volume of the Journal has its own subject and author index, together with a separate contents list to facilitate reference. Also, at times, the staff of the RRIM Library compiled and published bibliographies covering the publications of the Institute. The very first such bibliography is *A Bibliography of Contributions to Natural Rubber Research from the Rubber Research Institute of Malaya 1927-1967*, which was published in 1968. Again, in 1975 in conjunction with the Golden Jubilee celebration of the Institute, J. S. Soosai and H. W. Kaw, both librarians of RRIM's Library compiled a more comprehensive bibliography cover-

ing the literature in English up to May 1975. This bibliography was entitled *Fifty Years of Natural Rubber Research 1926-1975 : A Bibliography of Contributions from RRIM*. Thereafter, RRIM brought out annual publication with regards to its contribution to natural rubber, especially articles contained in its Journal and other publications.

Single journal bibliometric study in the field of agriculture

Bibliometric studies with single journal of various disciplines such as Science, Technology, Medicine, Arts, Humanities and Social Sciences have been rapidly growing for sometime past. The growth of literature of single journal bibliometric study has been quite substantial.

One of the earliest bibliometric study of this type is by Balog in 1980. He attempted a study on multiple authorship and author collaboration in agricultural research publications over the period 1958 to 1978, using an agricultural journal. He found that the frequency of single-authored papers dropped from 68.5% in 1958 to 34.3% in 1978 while the frequency of two-authored papers increased from 28.1% to 41.4%. It was also noted that over the same period the average number of authors per paper increased from 1.43 to 1.99.

Two years later, Deshmukh and Kumar (1982) analysed the citations in volumes 1-8 (1973-1980) of the *Indian Journal of Soil Conservation*, formerly known as *Soil Conservation Digest* to find out the important Indian and foreign journals in the field of soil conservation.

Van der Heij et al. (1990) reported a citation study on the full papers and synopses published in *Netherlands Journal of Agricultural Science (NJAS)* in

1984-1986. It was found that average citation yields were significantly lower for synopses than for full papers. The results also indicated that the citation yields varied strongly between the 3 years.

Majid (1995) examined two volumes of the *Pakistani Journal of Agricultural Research* to investigate trends in the publication of agricultural research literature; citation pattern; age of cited literature; frequently cited journals; and subject coverage of articles. The results indicated that the average length of articles was 5.1 pages with 13.2 citations per paper. Ninety percent of papers published accounted for joint authorship. The literature cited by Pakistani authors was old and the half-life of cited agricultural literature was about 11.5 years. It was also found that literature published in developed countries was preferred to regional agricultural literature.

Oliveira (1995) carried out a study of research into seeds reported in the *Revista Brasileira de Sementes (Brazilian Seed Review)* during the period 1979-1993. Bibliometric data such as author, affiliation, subject areas and footnotes were examined and analysed. The study revealed that the most productive authors were based in universities in South and Southwest Brazil and that the principal subject areas studied were soya, rice, beans and seeds.

Damodaram and Devarai (1995) examined using citation analysis of the references covered in the *Journal of Oilseeds Research* 1984-1993, which was published by the Indian Society of Oilseeds Research. He reported authorship patterns and collaboration coefficients and identified a list of ten core periodicals for oilseeds research based on the citation

analysis. On the other hand, Kalyane and Sen (1995), using the journal reported the results of a bibliometric study of 498 research articles on oilseeds published between 1984 and 1992. The study was aimed at determining space allotment for full length articles and short communications; authorship pattern; author productivity; prominent contributors; important locations of oilseeds research; pattern of tabular and graphical presentation; citation pattern; obsolescence of oilseed literature; Bradford distribution of citations; important keywords in the titles; and time lag between submission and publication of articles.

Sarala, also in 1995, presented the results of a bibliometric study of papers published from 1989-1994 in the *Journal of Tropical Agriculture*, an official publication of Kerala Agricultural University, India. Type of contributions, institution and country of origin and authorship pattern were analysed apart from citation analysis, average number of citations per article and type of documents cited. A ranked list of the 30 most commonly cited periodicals is given. It was noted that Indian journals occupied 8 of the top 10 positions in the ranked list.

It is very obvious and clear from the above literature review that single bibliometric study of journals in this part of the world, Malaysia, is totally lacking, especially in the field of agriculture. No such studies have been attempted by bibliometricians of this region so far, hence this study.

Objectives

The primary objectives of this study are

- i) to examine the nature of authorship pattern in a natural rubber research

journal;

- ii) to determine the frequency and mean number of references cited by researchers in the field of natural rubber as reflected in the Journal;
- iii) to determine the extent of acknowledgement being included in research articles of natural rubber;
- iv) to determine the extent of appendices being included in research articles of natural rubber;
- v) to determine the extent of collaborative research as indicated in the articles published in the *Journal of Natural Rubber Research* of RRIM;
- vi) to examine the international collaborative pattern and their partners involved in collaboration research in natural rubber.

Scope and limitations

The study is conducted basing on 258 research articles and short communications published in the *Journal of Natural Rubber Research* between the year 1987-1996. Acknowledgement, appendices and references appended at the end of these articles and the addresses and affiliations contained therein are also studied and analysed. Only collaborative research articles of inter-departmental, inter-institutional and international articles are taken into consideration. Collaborative research by staff of the same department in the same institution is not taken into account. The determination of the authors' departmental affiliation is based on the addresses and affiliation given in the articles themselves. In cases where the information is not complete, checks are conducted using annual reports of these institutions to find out the actual departmental affiliation of the authors,

which are readily available at the RRIM's Library.

Methodology

For such purposes, the content page of each issue of the Journal is collected, compiled and scanned to study the extent of collaborative research in each of the articles published between 1987-1996. After that, each individual article is scanned, checked, examined and tabulated for necessary data into separate sheets, in terms of the authorship pattern, authors' addresses and institutional affiliations, inclusion of acknowledgement and appendices. At the same time, the references appended by the respective authors at the end of each article are also scanned, counted and tabulated. The departmental affiliations of the researchers are verified using the annual reports of these institutions available at the RRIM's Library. Finally all the collected data were recorded, compiled, tabulated and analysed for making observations. The fact that this Journal is one of the earliest known scholarly journals in Malaysia makes it a rather interesting sample to study. Moreover, ready collections of past issues of the Journal are easily available in the library of the RRIM located at 260, Jalan Ampang, 50450 Kuala Lumpur, Malaysia.

Results and Discussion

I) Authorship pattern

Table 1 depicts the authorship pattern, which showed that concentration is on two-authored and single-authored articles (63.2%). Two-authored articles comprised the highest percentage (35.3%) of the total 258 articles. Single authored articles constituted 27.9%, of the total contribution between 1987-1996. Three

authored articles accounted for 21.7%, four-authored articles 10.5% and the rest i.e.; 4.6% were by five or more authors. Thus, multi-authored articles far outnumbered single-authored articles, comprising 72.1% of the total articles studied. In the sample studied, the one and only research article with the most number of authors is "Relationship between resistance to *microcyclus ulei* and clonal foliar phenolics of rubber trees" co-authored by eight researchers from France.

Table 1
Authorship pattern

Authorship	Number	Percentage
1	72	27.9
2	91	35.3
3	56	21.7
4	27	10.5
5	5	1.9
6	6	2.3
7	0	0.0
8	1	0.4
Total	258	100

II) Frequency in Distribution of References Cited

Table 2 shows the frequency in distribution of references cited in 258 research articles published in the *Journal of the Natural Rubber Research*. Most of the research articles (88.53%) had between 1 and 30 references. About 9.3% cited 31-50 references, and very few cited more than 51. The range of references cited per research article varies from 1 (the least) to 97 (the most), with the mean of 16.49 references per research article. Hence, it can be concluded that most research ar-

ticles published in the journal contained references.

Table 2
Frequency in distribution of references cited

No. of Citation Per Article	No. of Article	Percentage
1-10	83	32.17
11-20	113	43.80
21-30	35	13.56
31-40	19	7.36
41-50	5	1.94
51-60	1	0.39
61-70	0	0.00
71-80	0	0.00
81-90	1	0.39
91-100	1	0.39
Total	258	100

III) Acknowledgement in research articles

Table 3 depicts the status of acknowledgements being included in the research articles published in the Journal between 1987-1996 by the author or authors of the research articles. Out of a total of 258, 193 research articles (74.81%) contained formal acknowledgement while 65 research articles (25.19%) had no acknowledgement. In other words, most of the research articles published in the Journal contained acknowledgement.

Table 3
Acknowledgement in research articles

Acknowledgement	Frequency	Percentage
Yes	193	74.81
No	65	25.19
Total	258	100

IV) Appendix to research articles

Table 4 reveals the frequency of appendix or appendices being included in the research articles published in the Journal between 1987-1996. Only 20 research articles (7.75%) out of a total of 258 research articles published in the journal between 1987-1996 contained appendices while the rest 238 research articles (92.25%) did not contain appendices.

Table 4
Appendix to research articles

Appendix	Frequency	Percentage
Yes	20	7.75
No	238	92.25
Total	258	100

V) Collaborative research in natural rubber

Table 5 reveals the type of collaborative research in natural rubber as found in Journal of Natural Rubber 1987-1996. In terms of organizational collaboration, intra-departmental collaboration tops the

Table 5
Collaborative research in natural rubber

Type of Collaboration	Frequency	Percentage
Non-collaborative	72	27.91
Intra-departmental	95	36.82
Inter-departmental	22	8.53
Inter-institutional	34	13.18
International	35	13.56
Total	258	100

list with 36.82% while non-collaborative research accounted for 27.91%. Third highest is international collaboration which occurred in 13.56% of the cases

followed by inter-institutional collaboration which accounted for 13.18%, fourth highest. The least is inter-departmental collaboration, with 8.53%. Hence, it can be concluded that collaborative research in natural rubber as portrayed in the Journal is quite high (72.09%) as compared to non-collaborative or solo research at 27.91%.

Table 6 shows the international collaboration scenario as reflected in the Journal. The number of countries, which

collaborate, numbered 12. In terms of internationally collaborative papers, Malaysia tops the list with 28 papers, followed by United Kingdom (21), France (5), Thailand and Vietnam (3 each), Denmark, New Zealand and Sri Lanka (2 each) while Finland, Japan, Poland, and Spain (one each). In terms of collaborating partners, Malaysia tops again with 7 partners, followed by France and United Kingdom (4), Sri Lanka and Thailand (2) and the rest one partner only.

VI) International collaboration scenario

Table 6
International collaboration scenario

Country Name	No. of Collaborative Papers	Collaborating Partners (the numbers in brackets indicated the number of collaboration)
Denmark	2	Malaysia (2)
Finland	1	Malaysia
France	5	Poland, Sri Lanka, Thailand (2), United Kingdom
Japan	1	Malaysia
Malaysia	28	Denmark (2), Finland, Japan, New Zealand (2), Thailand, United Kingdom (18), Vietnam (3)
New Zealand	2	Malaysia
Poland	1	France
Spain	1	United Kingdom
Sri Lanka	2	France, United Kingdom
Thailand	3	France (2), Malaysia
United Kingdom	21	France, Malaysia (18), Spain, Sri Lanka
Vietnam	3	Malaysia

Conclusion

The following conclusions are drawn from the study :

1. The number of multi-authored research papers is high at 72.1% or 186 papers out of a total of 258. This indi-

cates that in the years to come, the trend is towards multi-authorship.

2. The range of references cited in the research articles of Journal of Natural Rubber Research is 16.49.
3. Out of a total of 258 research articles,

193 or 74.81% contained formal acknowledgement, meaning that acknowledgement is a common practice among natural rubber researchers.

4. On the other hand, only 20 or 7.75% of the 258 research articles contained appendix or appendices indicating the lack of habit on the part of the researchers to furnish additional information.
5. The percentage of collaborative paper among natural rubber researchers is quite high, at 72.09%. This means that team research is going to be a common practice in scientific activity, especially natural rubber research.

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Erratum : In the page 24, 2nd column of Vol. 43(1) under the sub-heading 'Proposed topic for the next year', the actual topic has not been printed. The topic is **READABILITY STUDIES**. The inconvenience is regretted.