DOCTORAL DISSERTATIONS ON HORTICULTURE IN AGRICULTURAL SCIENCES IN WEST BENGAL: A BIBLIOMETRIC STUDY, 1991-2010

Abstract of the Thesis Submitted to University of Kalyani for the Award of the Degree of Doctor of Philosophy in Library & Information Science

By
Santosh Kumar Tunga

Supervisor
Sri Sabuj Dasgupta
Associate Professor
Department of Library & Information Science
University of Kalyani

Department of Library & Information Science
Faculty of Arts & Commerce, University of Kalyani
Kalyani, Nadia, West Bengal, India
November, 2014
ABSTRACT

After the independence of India much importance has been given to education and research in the development of the country and a large number of Universities, Research and Development Institutions and Indian Institute of Technology (IIT) were established. Bidhan Chandra Krishi Viswavidyalaya (BCKV) came into only being in West Bengal, India in 1974. Since February 2001, BCKV has undergone a number of major structural changes. Its North Bengal campus at Cooch Behar along with three Northern Regional Stations at Kalimpong, Cooch Bihar and Dinajpur have emerged into a new Agricultural University, Uttar Banga Krishi Viswavidyalaya (UBKV), to cater more intensively to the needs of agriculture in North Bengal districts. These two Agricultural Universities are engaged in the pursuit of excellence in research and education in agriculture and its related fields.

West Bengal is located between 21031’ and 27014’ N latitude and 85051’ and 890 E longitudes. It is flanked by the Bay of Bengal in the south, Sikkim on the north, Assam on the east and Jharkhand and Orissa on the west. It covers an area of 8.85 million hectares, representing only 2.7% of the total area of the country. The state is divided into 19 administrative districts, viz. Bankura, Birbhum, Burdwan, Coochbehar, Darjeeling, Hooghly, Howrah, Jalpaiguri, Kolkata,
Malda, Midnapore-East, Midnapore-West, Murshidabad, Nadia, North 24 Parganas, North Dinajpur, Purulia, South 24 Parganas, and Soth Dinajpur.

Horticultural crops play a unique role in our state economy by improving the income of the rural people. Cultivation of these crops is labour intensive and as such they generate lot of employment opportunities for the rural population. Fruits and vegetables are also rich source of vitamins, minerals, proteins, and carbohydrates etc. which are essential in human nutrition. Hence, these are referred to as protective foods and assumed great importance as nutritional security of the people. Thus, cultivation of horticulture crops plays a vital role in the prosperity of a nation and is directly linked with the health and happiness of the people. Horticultural crops are not only important components of a balanced diet but their development for high value markets is seen as an important engine of growth for economic development.

Theses and dissertations reflect the scholarly communication process. Bibliometrics and citation characteristics of dissertations like, the subject fields of dissertations, the number of citations and their distribution by type of sources, years, and by number of authors etc., have been studied with a view to identify the basic features of the scholarly communication process in different fields of study. The characteristics of cited sources that appear in the bibliographies of dissertations have been used not only to help identify core journal titles in specific subject field but also that can be use in collection management decisions and bibliometric evaluations.

The purpose of the present study is to determine the bibliometric characteristics of the horticulture research in the Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur and Uttar Banga Krishi Viswavidyalaya (UBKV), Cooch Bihar, West Bengal, including trend in dissertation submission, word length, crop wise break-up, supervisor’s contribution, page length
of dissertations, bibliographic forms of cited documents, subject wise break-up, most cited journals, collaboration in authorship, etc. In order to study the horticulture research in both universities, a total of 80 doctoral dissertations accepted and awarded between 1991 and 2010 are used as a source. The study is based on 80 doctoral dissertations and its 10,845 citations appended to these dissertations in the field of horticulture, submitted the BCKV and UBKV, during 1991-2010.

Bibliometric study is an ideal for librarians to develop and provide innovative services. It is truly an interdisciplinary research field for expanding almost all the scientific fields. The word ‘bibliometric’ is derived from Latin word ‘biblio’ and the Greek word ‘metrics’. Etymologically it means the application of mathematics for the study of bibliography. This term was coined by the British scientist Alan Pritchard in 1969. Earlier the term ‘Statistical Bibliography’ was also used for it. However, it is important to mention here that the father of library science in India i.e. Dr. S.R. Ranganathan introduced the term 'Librametry' in 1948, which is analogous to bibliometrics. Bibliometric indicators are quite useful in examining the direction and flow of research-based knowledge and also for mapping the structure and changing the shape of knowledge creation, resources and infrastructure of a particular journal, institution and a country. Thus, bibliometrics provide an aid for the studies of the growth of the literature in any subject, the extent of literature contributed by various individuals, groups, organizations or countries, the availability of literature in various languages, varieties of literature available on a subject (e.g. over documentary types, language journals), and the studies of obsolescence of the literature on a subject.
The **first objective** is to study the content of eighty doctoral dissertations in horticulture submitted by researchers to the BCKV and UBKV during the study period. Here, the objective is to make a content analysis of the following variables:

- Growth of the dissertations
- Titles of the dissertations
- Contribution of supervisors
- Gender-wise distribution of supervisors and research scholars
- Number of pages, chapters and illustrations used in dissertations

The **second objective** is to study the literature use made by the researchers in horticulture by making a bibliometric distribution of cited references given at the end of the doctoral dissertations. Here, the objective is to study the significance of the following aspects relating to the citation analysis:

- Form of documents cited by the researchers
- Analysis of the journal citations
- Analysis of the journal article citations
- Analysis of the book citations
- Analysis of the conference papers and proceeding citations
- Analysis of the dissertation citations
The third objective is to study the publication output of the horticultural scientists of BCKV and UBKV to cited journal and books during the study period 1991-2010 against the following characteristics:

- Contribution of scientists to journal article and book citations
- Self-citing scientists
- Choice of journals and books for publications by the scientists

The literature on horticulture is an interesting as well as an appropriate area for bibliometric investigation. The analysis of the literature consisted of two major kinds:

1. Source literatures

The first endeavour was the content analysis of eighty doctoral dissertations on horticulture submitted by researchers to the BCKV and UBKV during the study period. Here, it is designated those dissertations as source literatures or citing documents.

2. References

The second endeavour was the citation analysis of the literature consisting of all forms of documents cited as references or bibliographical references or bibliographies in the doctoral dissertations. Here it is designated as cited references or cited documents.

The sampling procedure for the study was purposive since data was being collected for specifying a target period from 1991 to 2010. This sample also represented the total population of the dissertations. The population of the study was the total population of eighty doctoral dissertations submitted within the coverage period of the study. All eighty doctoral dissertations
were analyzed. Title pages and the list of references were photocopied from each of the eighty
dissertations. All photocopies of each dissertation were manually examined and citations were
extracted from the list of references of each of the dissertation. Data extracted from the
dissertations included dissertation title, research scholars, research scholar’s department, year,
page length, subject area, illustration and figures presentation, supervisor-ship patterns,
designation and gender of supervisors. The data of the study were also collected and evaluated
with the help of citation analysis. Citation analysis was widely applied to the bibliographic data
from journal articles, books, conference papers, and theses & dissertations only. The extracted
data were entered into the computer using MS-Excel Worksheet. Frequency distributions, charts,
graphs, and measures of central tendency like mean and median were obtained by using MS-
Excel. The gathered data were analyzed using descriptive statistics of frequency counts,
percentages and cumulative percentages.

First part of the analysis is designed to content analysis of eighty doctoral dissertations in
relation to growth rate, titles, supervisors, researchers of dissertations; pages, chapters and
illustrations used in dissertations. The second part is a citation study of cited documents used by
the horticultural scientists. The third part is a study of the contribution of horticultural scientists
of BCKV and UBKV during the period from 1991 to 2010.

After scanning all relevant documents the bibliometric techniques have been applied to study the
horticultural literature. Hence, in order to represent the present study in lucid and comprehensive
way, the whole content is divided into nine chapters. The first chapter is primarily devoted to the
statement of the research problem taken up for this study along with all its essential associated
elements. The need for a comprehensive study on the doctoral dissertations in horticulture has
been presented. The research problem formulated as a descriptive statement has been converted

6
into a set of interlinked questions to which the study intends to create the answer. Then the objectives of carrying out this study are provided. The rationale of the study is discussed next. It is followed by the limitations of the study. Conspectus has been given at the end.

The second chapter attempts to review of the research results which warrant being considered as directly as well as indirectly relevant to the research problem of this study.

The third chapter presents the research methodology which is used for the purpose of this study with reference to its general as well as specific objectives.

The fourth chapter focuses on the horticulture in India and West Bengal and also discusses horticulture research in India.

The fifth chapter is concerned with the concept of bibliometrics and citation analysis. It is followed by the definition of bibliometrics and its history and development. Then the scope and facets, Laws of bibliometric, application and limitations of bibliometric methods are also discussed. Next the concept of citation analysis and important areas of citation analysis are presented.

Chapter six presents the content analysis of the doctoral dissertations during the study period. The important conclusions drawn from this chapter are as follows:

- The maximum number of dissertation contribution was 28 (35%) in the Department of Fruit & Orchard Management and the minimum number of dissertation contribution was 4 (5%) in the Department of Floriculture & Landscaping during the period of study.
Average number of dissertations submission per department is 13.333 and standard deviation is 8.360.

Average number of dissertation submission per year is 4 and the standard deviation is 2.345.

The future trend of dissertation submission in horticulture will have very slow increasing trend i.e. 11.487 and 13.407 dissertations in the year 2015 and 2020 respectively.

The grand average number of citations per dissertation is 135.562 citations.

The maximum average number of citations per dissertation is in the Department of Post Harvest Technology of Horticultural Crops with 189.8 citations and the lowest with 119.112 citations in the Department of Spices & Plantation Crops.

The grand average number of citations per page of dissertation is 9.522 citations.

Average number of citations per page is the highest with 11.233 citations in the Department of Floriculture & Landscaping and the least with 8.473 citations in the Department of Horticulture.

Average number of words used per dissertation is 13.437 and standard deviation of words is 1.576.

Among 1014 words, only 733 words are considered as keywords. The words of having frequency/occurrence greater than 5 were only 21 in number. Obviously, the word Studies had the maximum frequency of 31. The other keywords in the decreasing order of frequency were: West Bengal > Mango > Management > Growth > Production > Fruits
Varieties Development with 19, 14, 13, 12, 12, 11, 11 and 11 occurrences respectively.

- The value of the products of rank (r) of a keyword and frequency (f) of occurrence of the keyword ranged between log 1.491 and log 2.416. The graphical presentation of rank (r) and frequency (f) on logarithmic scale turned out to be a straight line which indicates the applicability of Zipf’s Law data in horticultural literature.

- Maximum number of dissertations was submitted on ‘Mango’ with 14 (17.5%) citations, followed by ‘Litchi’ with 6 (7.5%) citations and ‘Pointed gourd’ with 5 (6.25%) citations.

- S K Mitra has supervised the highest share with 10 (11.628%) doctoral dissertations.

- Out of total 80 doctoral dissertations, the maximum 74 (92.5%) dissertations are from single supervisorship and only 6 (7.5%) dissertations are from double supervisorship during 1991 to 2010.

- The research culture in horticulture is favourable towards supervisors in Professor and Reader/Associate Professor rank with almost 93.023 percent doctoral dissertations.

- 98.837% of Male supervisors and only 1.163% of the remaining were occupied by Female supervisors who supervised doctoral dissertations during the period of study.

- 67 (83.75%) male researchers and 13 (16.25%) female researchers were submitted doctoral dissertations during the period of study.

- The maximum number of text pages appeared in dissertations is 297 pages and the minimum number is 53 pages.
- Average number of text pages per dissertation is 134.187 pages and standard deviation is 52.280 pages.

- The maximum number of bibliographic pages appeared in dissertations is xlix pages and the minimum number is iii pages.

- Average number of bibliographic pages per dissertation is approximate XV pages and standard deviation is approximate IX pages.

- The maximum number of appendix pages appeared in dissertations is xvi pages and the minimum number is ii pages.

- Average number of pages of appendices is 5.75 pages and standard deviation of pages of appendices is 2.989 pages.

- Average number of chapters per dissertation is 5.712 and standard deviation of chapters is 0.556.

- The mean of tables of total 80 doctoral dissertations is 42.237, median is 39.5 and mode is 30.

- The mean of figures / diagrams of total 80 dissertations is 22.95, median is 18.5, and mode is 10.

- The mean of plates / photographs is 7.137, median is 10 and mode is 7.

Chapter seven attempts to present the citation analysis of the doctoral dissertations. This chapter analyzed cited journals, journal articles, books, conference papers and also theses & dissertations. The outcomes of this chapter are as follows:
The highest numbers of recorded citations are from periodicals with 8571 (79.032%) citations. Under periodical form of document, journal articles occupied with 8437 (77.796%) citations.

Book source with 1403 (12.937%) citations is the next favoured bibliographic form of the researchers in horticulture.

Journal articles and book citations both constitute 90.733% citations of the total citations.

Web resources citations are the lowest i.e. 16 (0.147%) citations.

The maximum average number of citations per dissertation is 189.00 citations in the year 2004 and the minimum is 52.33 citations in the year 1994.

The average number of citations per dissertation is calculated to be 135.56 during the period of study.

The average number of journal citations per doctoral dissertation during the year from 1991 to 2010 is calculated as 30.25 citations and standard deviation is 20.225 citations.

‘Hort Science’ occupied the first rank with 441 (5.227%) citations of the total journal citations and followed by ‘Journal of the American Society for Horticulture Science’ with 405 (4.801%) citations.

According to Bradford the relationship of three zones is an approximately geometric series in the form 1: n: n². But it is found that the relationship of each zone in the present study is 6: 17: 522 = 6: 6×3: 6×9² =1: 3: 9² = 1: 3: 3⁴

When 3=n, then 1: n: n⁴,
Therefore, Bradford’s law does not fit well in cited Journals.

- By applying the Leimkuhler model for the verification of Bradford’s law of scattering, it is found that the percentage error (0.1834) is very negligible. So the Bradford’s law fits very well in journal citations data set. Although three zones are not exactly the 1/3rd of total citations as mentioned and proved by Bradford. There is no exact match in the number of citations of each group.

- Out of total 545 journal citations of both Indian and foreign, 191 journal citations are from India, which comes to 35.046 percent citations. This clearly indicates that Indian researchers in horticulture use more foreign journals for their research work than Indian ones.

- ‘South Indian Horticulture’ ranks the top with 397 (11.148%) citations. The same journal is also coming to the third position in the common rank list of Indian and foreign journals also.

- The most of the journal citations come from India with 191 (35.046%) citations and followed by USA with 94 (17.248%) citations.

- Subject distribution of research indicates that maximum number of 142 (26.055%) journals has been cited in the field of horticulture and followed by agricultural science numbering 130 (23.853%) citations.

- Out of a total 545 journals, 534 of them are in English language forming 97.982 percent citations; while all other 6 languages account to 2.018 percent citations only.
The most of the journals of the researchers prefer 149 (27.340%) citations in the period 1970-1979, followed by 137 (25.138%) citations in the period 1960-1969 and 76 (13.945%) citations in the period 1950-1959.

The mean year of journal citations is found to be 47.123 and the half-life of journals cited by the researchers is calculated as (median year) 43.791 years.

The maximum number of article citations was 289 citations and the minimum number of article citations was 7 citations.

The maximum value of the average number of article citations per doctoral dissertation is 145 citations in the year 1991 and minimum is 39.67 citations in the year 1994.

The grand average number of journal article citations per dissertation is calculated to be 105.46 during the period of study.

Out of 8437 citations, 1763 (20.896%) citations are single authored journal articles, 6665 (78.997%) citations are multi-authored journal articles and 9 (0.107%) citations are written by anonymous authors.

A grand average journal article citation per dissertation is 105.460 citations.

The average of cited authors per journal article during 1991-2010 is calculated as 2.484 citations.

A total of 20,915 authors are contributed 8,428 journal articles (excluding 9 anonymous articles).
In this study, Dmax is greater than the Kolmogorov-Smirnov test (K-S test) critical value. Therefore, this result indicated that the distribution of author productivity is not match by the Lotka’s Law. The consequence means the Lotka’s law is not suitable for the literature author productivity distribution in horticultural research.

The grand average number of authors per article is 2.482 citations.

Two authors 3125 (37.039%) citations are highest in the cited journals followed by three authors 2119 (25.116%) citations, single author 1763 (20.896%) citations and four authors 956 (11.332%) citations.

The degree of collaboration in horticulture is 0.791.

‘Mango-growth’ ranked highest with 277 scores representing 3.284 percent citations, ‘Litchi production’ and ‘Pointed gourd-Genetic diversity’ followed with 268 scores representing 3.176 percent citations each. ‘Chilli-Fertilizers’ recorded 255 scores representing 3.022 percent citations, and Banana-Chemical compositions’ recorded 246 scores representing 2.916 percent citations.

English language occupies the first place with 91.229 percent of the total citations, followed by German with 3.010 percent, Russian with 2.311 percent.

The maximum number of 7156 (25.198%) citations preferred by the researchers in the period 1990-1999 and closely followed by 5030 (24.535%) citations in 1980-1989. Total 49.733% of journal citations are in the period of 1980-1999.
The Mean year of journal article citations is found to be 28.703 years and the half-life of journal article citations by the researchers is calculated as (Median year) 24 years.

The maximum number of book references per dissertation is between 14-18 citations, appeared in 26 (32.5%) dissertations and closely followed between 9-13 citations, appeared in 21 (26.25%) dissertations.

The average number of book citations per doctoral dissertation during 1991-2010 is calculated as 17.538 citations.

Out of total 1403 citations, the maximum number of book citations with 149 (10.620%) are cited in the dissertations in 2005 and followed by 142 (10.121%) citations in 2006 as second position. The lowest number of book citations with 9 (0.641%) are cited in 1998.

The maximum number of books is with single author 692 (49.322%) citations, books with two authors 458 (32.644%) citations occupy the second positions followed by three authored books 108 (7.698%) citations.

Single and two author books constitute 81.966 percent of the total citations.

The degree of collaboration in book citations is 0.488. The trend is definitely indicative towards less collaboration within authors.

The highest collaboration is found 0.667 in 1998, followed by 0.625 in 2004 and 0.598 in 2007.

India ranks first with 511 book citations forming 36.422 percent citations of the total 1403 book citations. It is followed by USA with 453 (32.288%) book citations.
- Out of 1403 citations, the citations of Indian books are 511 (36.422%) and the citations of foreign books are 892 which come to 63.578 percent.

- A State/Union Territory-wise analysis reveals that the majority of the books are published from Delhi with 298 citations (58.317%) and 66 books (12.916%) are published from West Bengal as the second rank.

- The majority of the books are published from New Delhi/Delhi with 298 (58.317%) book citations, followed by 66 (12.916%) citations from Calcutta/Kolkata, 25 (4.892%) citations from Madras/Chennai.

- Top three cities cover 76.125 percent citations, top eight cities/towns cover 90.999 percent citations and remaining 20 cities/towns cover 9.001 percent citations of the total citations.

- ‘Statistical methods-Agricultural workers’ account for 149 (10.620%) citations, ‘Soil chemical analysis’ with 139 (9.907%) citations, ‘Agricultural chemistry’ with 130 (9.266%) citations, and ‘Soil-analysis’ with 117 (8.339%) citations.

- The top only 3 subject covered 29.793 percent of total cited books, top 7 subjects covered 50.961 percent, top 26 subjects covered 73.272 percent citations and other 84 remaining subject areas has been covered ‘4 & below’ citations with 375 (26.728%) citations.

- Out of a total 1403 citations, 1391 of them are in English language forming 99.145 percent of the total citations, while all other four languages accounted to only 0.855 percent citations. So from this study it is found that English is the dominant language.
The most cited book is ‘Statistical methods for agricultural workers’ cited 149 (10.620%) times, followed by ‘Soil chemical analysis’ cited 139 (9.907%) times, ‘Official methods of the analysis’ cited 126 (8.981%) times and ‘Soil and plant analysis’ cited 101 (7.199%) times.

The ‘Indian Council of Agricultural Research (ICAR), New Delhi’ takes the top position in Indian publisher with 183 (13.043%) citations, followed by ‘John Wiley, New York’ with 156 (11.120%) citations as the second position in foreign publisher and ‘Association of Official Agricultural Chemists, Washington’ with 127 (9.052%) citations as third position in foreign publisher.


The Mean year of book citations of doctoral dissertations is found to be 31.056 and the Half-Life of books cited by the horticultural scientists is calculated as (Median Year) 27 years.

The maximum number of conference papers cited with 65 (12.695%) citations in 2009, followed by 51 (9.961%) citations in 2001 and 49 (9.570%) citations in 2000.

The maximum average number of conference paper citations per dissertation is 21.00 citations in 1996 and the minimum is 0.50 citations in 1992.

The grand average number of citations per dissertation is calculated to be 6.40 citations during the period of study.
➢ Out of 512 citations, 198 (38.672%) citations are single authored conference papers and 314 (61.328%) citations are multi-authored conference papers.

➢ Among the multi-author conference papers, the share of three author contributions is found to be more i.e. 140 (27.344%) citations, followed by 118 (23.046%) citations of two author contribution and 35 (6.836%) citations of four author contributions.

➢ The degree of collaboration in cited conference papers is 0.613. The trend is definitely indicative towards more collaboration within authors. The highest collaboration is found 1.000 in 1992, followed by 0.750 in 2002, 0.692 in 1999 and 0.686 in 2001.

➢ ‘Yams-Fertilization’ ranked highest with 33 (6.445%) citations followed by ‘Citrus-Nutrition studies’ with 28 (5.469) citations; and ‘Mangoes-genetic diversity’ & ‘oranges-growth’ with 25 (4.883%) citations each.

➢ ‘Golden Jubilee Symposium Horticultural Society of India’ scores the highest percentage (6.641%) of citations, followed by ‘National Symposium of Banana Production Technology’ with 4.883 percent citations and ‘Sixth International Grass Land Congress’ with 3.516 percent citations.

➢ The highest symposium proceedings are used by the researchers in their dissertation references with 228 (44.531%). Symposium covered at national level with 106 citations and at international level with 122 citations. Seminar ranked second with 84 (16.406%) citations at national level 34 citations and at international level 50 citations, followed by congress with 80 (15.625%) citations at national level 14 citations and at international level 66 citations.
- Three editors constituting 233 (45.507%) citations occupy the first place and followed by two editors with 181 (35.352%) citations.

- Researchers have preferred Indian conference proceedings with 265 (51.758%) citations. Australia ranked second in order with 59 scores, representing 11.523 percent and USA 46 scores, representing 8.984 percent.

- The Indian state wise analysis of cited conference proceedings indicate that out of 265 citations, 44 (16.604%) is from Karnataka state, followed by Tamil Nadu covered with 41 (15.471%) citations.

- Bangalore (Karnataka) and Coimbatore (Tamil Nadu) have contributed the highest number of conferences i.e. 41 (15.472%) citations each, followed by 23 (8.679%) citations each from Kasaragod (Kerala) and New Delhi, 18 (6.793%) citations from Kalyani (West Bengal), and 16 (6.038%) from Nagpur (Maharashtra).

- Out of 512 cited conference proceeding citations, the maximum number of conference proceedings are related to ‘Horticulture’ with 98 (19.141%) citations, followed by Bananas with 55 (10.742%) citations, Fruit science and Mango with 40 (7.813%) citations each and Citrus culture with 26 (5.078%) citations.

- There are more number of conference proceeding citations 153 (29.882%) distributed in the period 1990-1999, followed by 148 (28.906%) citations in the period 1980-1989 and 113 (22.071%) citations in the period 1970-1979.

- The Mean year of cited conference proceeding is found to be 23.408 and the half-life of conference proceedings cited by the researchers is calculated as (Median year) 19 years.
Out of 83 doctoral dissertations used by the researchers during this period, 11 citations are the highest used in 2009, followed by 10 citations in 2000, 9 citations in 2000, 8 citations in 2003 and 7 citations each are used in 2005 and 2006.

Out of 75 master dissertations used by the researchers during this period, 13 dissertations are the highest used in 2006, followed by 10 dissertations are used in 2009, 9 dissertations are used in 2000 and 7 dissertations are used in 2008.

‘Evaluation of Mango Varieties and Hybrids of West Bengal’ and ‘Studies on the Improvement in the Methods Litchi Production in West Bengal’ these two dissertations occupy the first rank with 4.820 percent citations each.

The researchers have preferred Indian dissertations with 131 (82.911%) citations. USA ranks second in order with 9 (5.696 %) citations, followed by China 8 (5.063%) citations, UK with 5 (3.165%) citations. The minimum number of citation is 1 (0.633%) in Bangladesh only.

Out of 131 dissertation citations, West Bengal, being the host state of the both BCKV and U BKV where the majority of the researchers received the highest number 58 (44.275%) of dissertation citations, followed by Maharashtra with 12 (9.160%) dissertation citations and Delhi & Tamil Nadu with 10 (7.634%) dissertation citations each.

The lowest number of dissertations received from Assam and Madhya Pradesh states with 1 (0.763%) dissertation citations each.

It is observed that researchers have cited a total of 158 dissertations during 1991 to 2010. ‘Bidhan Chandra Krishi Viswavidyalaya’ contributes the highest dissertations 57
(36.076%) citations, followed by ‘Indian Agricultural Research Institute’ and ‘Tamil Nadu Agricultural University’ with 10 (6.329%) citations each and ‘South China University’ with 8 (5.063%) citations.

- The researchers prefer 58 (36.709%) dissertation citations for the period 1980-1989 and followed by 51 (32.278%) dissertation citations for the period 1990-1999.

- The Mean year of dissertations cited by the researchers is calculated to be 22.8 years and half-life of dissertation citations is calculated as (Median year) 22.5 years.

Chapter 8 examines the contribution of horticultural scientists of BCKV and UBKV to cited journals and also cited books. The major conclusions drawn from this chapter are as follows:

- The most prolific author was S N Ghosh who topped the list of cited journal articles with 23 (9.584%) papers each during the 1991-2010, followed by M A Hasan with 21 (8.750%) papers, P Dutta with 18 (7.5%) papers, P Hazra with 17 (7.084%) papers, S K Mitra with 14 (5.834%) and H Sen with 11 (4.584%) papers.

- The most credited author to cited articles was S N Ghosh with 18.166 points, followed by S K Mitra with 17.791 points, P Dutta with 13.250 points, M A Hasan with 12.082 points, P Hazra with 9 points and so on.

- The present study reveals 65 number of total supervisors self citation comprising 0.771 percent of total journal article citation and 27.083 percent of total contributed supervisors. The ratio of Self-Citing Supervisors (SCS) to total citation is 1:129.8 and the ratio of SCS to contributed supervisors is 1: 3.692.
The present study identifies 6 researchers self citations that account to 0.071 percent of the total article citations and 11.321 percent of the total researchers citations. The ratio of researchers self citation to total citations is 1:1406 and the ratio of researchers self citation to contributed researchers is 1:9.

‘The Horticultural Journals’ takes the top position in Indian Journals with 31 (15.98%) citations and followed by ‘Indian Journal of Horticulture’ with 27 (13.918%) citations.

The top position is occupied by ‘Environment and Ecology’ with 22 (47.827%) article citations and followed by ‘Acta Horticulturae’ with 13 (28.261%) article citations.

The most prolific author is T K Bose who tops the list of cited books with 66 (78.572%) citations and followed by S K Mitra with 7 (8.333%) citations.

The most credited author to cited books was T K Bose with 20.125 points and followed by M G Som with 14.125 points.

Out of total 84 contributed supervisors, 10 number of supervisors self-citation comprising 0.753 percent of total book citations and 11.905 percent of total contributed supervisors.

The ratio of supervisor self-citations to total book citations is 1 : 132.7 and the ratio of supervisor self citation to total contributed supervisors is 1: 8.4.

The present study identifies 2 researchers self citations that accounts to 0.151 percent of total citations of books and 22.23 percent of the total contributed researchers.
The ratio of researcher self citations to total citations is 1: 663.5 and the ratio of researcher self citations to total contributed researchers is 1: 4.5.

‘Commercial Flower’ takes the top position in Indian books with 24 (32.876%) citations and followed by ‘Fruits: Tropical and Sub-tropical’ with 18 (24.658%) citations.

‘Overview of Lychee Production in the Asia-pacific Region’ and ‘Genetic Improvement of Vegetable Crops’ occupy the first preference by the scientists with 4 (36.364%) citations each and followed by ‘Postharvest physiology, Handling and Utilization of Tropical and Sub-tropical Fruits and Vegetables’ with 2 (18.181%) citations as second choice.

The last chapter entitled findings and conclusion summarizes the findings, Recommendations, conclusion and also presents some implications for future scope of research.

All the chapters of the report are enriched with introduction and references. A Bibliography is included at the end of report for the benefit of those who are interested in pursuing further study.

The present study is the first of its kind to study the bibliometric indicators in horticultural literature. This is a preliminary study on horticulture research in West Bengal. This may trigger more bibliometric studies for the purpose of evaluating horticulture research in India. Such study would be useful in devising appropriate policies to alleviate the horticulture status of India.

It is hoped that this study will be helpful to researchers who want to identify primary sources of information. Studies of this kind will be useful for library and information professionals who want to provide suitable services for users and researchers. It can also serve as a feedback to librarians in the selection and acquisition of journal, book and other important documents most
useful to researchers in horticulture. The findings from this study could serve as a collection
development model that libraries could use to identify the budget planning; to guide collection
management and user services design in horticulture as well as agricultural university libraries.

(Signature of the Supervisor)                                             (Signature of the Research Scholar)