

**Digital archiving of Ph. D Theses and reprint  
collections of KFRI Library using an open source  
content management software**

[Final Report of Project KFRIRP-668/2013]

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**September 2017**

## PROJECT DETAILS

- |                      |   |
|----------------------|---|
| a. Project Number    | KFRI RP-668/2013  |
| b. Title             | Digital archiving of Ph. D Theses and reprint collections of KFRI Library using an open source content management software  |
| c. Funding Agency    | KFRI Plan Grant   |
| d. Duration          | 2 yrs. (1 <sup>st</sup> July 2013 to 30 <sup>th</sup> June 2015)  |
| e. Objectives        | <ol style="list-style-type: none"><li>1) To digitize all the available theses and the reprints in the library.</li><li>2) To prepare metadata for each thesis and reprint and store them in a database.</li><li>3) To develop technology for selective dissemination through packages such as DSpace.</li><li>4) To integrate the theses into existing KFRI digital collection.</li></ol> |
| f. Investigators     | Sarojam, N.<br>Hussain, K.H.<br>George, K.F.  |
| g. Project Assistant | Midhu, P.B.   |
| h. Expected Output   | A digital collection of all the Ph D theses and the reprint collections of KFRI library will be made available for searching from the library portal.   |

# CONTENTS

Acknowledgements	
Abstract	
Introduction	1
Objectives	2
Materials and Methods	2
Theses	2
Reprints	3
Digitization	4
Databases	5
Results and Discussions	6
KFRI Library Portal	6
Dspace	6
Conclusions	12
List of Theses	13

## **ACKNOWLEDGEMENTS**

We are grateful to Dr. K.V. Sankaran, former Director and Dr. M. Balagopalan, Research Coordinator for their support in implementation of this project. We are indebted to Shri. K. Ravindran, former Librarian, KFRI, who have set the trend of collecting reprints from various sources for the research programmes and organized in such a way to make it available when it is required. We are also grateful to Smt. C.K. Prejitha, Smt. R. Yamini, Mr. Emmanuel Wilson, Smt. M.S. Sowmya and Smt. V. Sharna, for their assistance in various stages of this project. We are also grateful to Dr. P. Vijayakumaran Nair, former scientist, KFRI and Dr. V.B. Sreekumar, scientist, KFRI for their editorial comments and suggestions.

## **ABSTRACT**

Digital revolution has brought drastic changes in information storage, access and retrieving processes. Many of the barriers which hinder the steady flow of information are removed by digitization. Both digital and web technology have emerged as the best means to preserve precious document resources and make them accessible through network. Digitized documents can be well organized, stored and retrieved more conveniently than printed documents.

In KFRI Library, and in other libraries, Ph D theses were not easily available for reference. There was no way to know the theses available in a subject. Available theses were kept as reference books with limited access and not allowed for photocopying, lending or distribution.

There is always much demand for the theses produced in KFRI. Many of the theses produced at KFRI were based on the work done in Kerala part of the Western Ghats. Earlier, much research work was not there in universities or institutions in forestry and environment. So the work carried out in institutions like this were in much demand. Now much research is going on in Forestry and Environment in many universities and colleges. After the recognition of FRI as deemed university, KFRI is approved as a research centre and introduced Ph D programme.

The huge collection of reprints in the library consists of not only journal articles but papers presented in seminars, chapters of books, reports, etc. Most of the reprints were very old, brittle and torn and in very few pages. Digitization of these documents has helped to make it available when it is required. Library space could also be saved. On top of all these advantages, digital archiving of these collections associated with its efficiency in search and retrieval has enabled the researchers to access the full text from their desktop.

# INTRODUCTION

Forests and forestry have attracted greater attention all over the world in view of the complex role it plays in the environmental amelioration besides the social and economic benefits they provide. By conducting research in forestry and related aspects in the state over the last four decades, significant contributions in the subject made by Kerala Forest Research Institute (KFRI) brought out much valuable information useful for scientific and sustainable management of forests. Generated information has come out in various forms such as reports, journal articles, books, seminar papers, theses and dissertations and popular articles. These publications constitute the key research output and intellectual capital of the institution which contain very valuable and detailed information such as data, observations, analysis and best practices. Library, being a store house of these publications of KFRI, it was necessary to preserve these documents for ever. Digital archiving is an ideal method for preserving valuable documents for wider use. We have taken up the task of digital archiving of these publications and completed the task of digitizing research reports, scientific papers, proceedings, books and other stray documents published by KFRI. Digital archiving of different collections such as bamboo, teak, cane, sacred groves and Indian Forest Records was carried out simultaneously. As part of this project, digital archiving of theses and reprint collections of the library was taken up and we could carry out the task with the help of well qualified unemployed hands with limited funds. By this task, we could save much of the space in the library. All these documents are made readily accessible to the scientists and researchers. This exercise has enabled sharing of valuable information generated by experienced scientists and researchers among researchers in KFRI. An overview of the work implemented to provide online access to these valuable resources at researchers' desktop is briefly presented in this report.

## **OBJECTIVES**

- 1) To digitize all the available theses and the reprints in the library.
- 2) To prepare metadata for each thesis and reprint and store them in a database.
- 3) To develop technology for selective dissemination through packages such as DSpace.
- 4) To integrate these theses and reprints into the existing KFRI digital collections.

## **MATERIALS AND METHODS**

### **Theses**

KFRI is recognized as the research centre of Forest Research Institute, Dehra Dun (Deemed University) in 1981 and later Calicut University, Cochin University and now MG University have recognized KFRI as its research centre. As part of the projects undertaken by KFRI, those who were working in research projects were allowed to register for PhD in one of the above universities. A copy of each of the theses is deposited in the library at the time of submission of the thesis. So far KFRI has produced 112 PhDs and the catalogue of these theses is made available in KOHA, an integrated software for searching. Most of the theses were produced based on the ongoing projects undertaken by KFRI. KFRI research reports and scientific papers were already brought out in digital form and by the digitization of theses a complete picture of the work carried out in KFRI could be projected.

Theses contain new ideas, innovations and new results in highly specific and minute topics. The access to doctoral thesis deposited in the university libraries was restricted to the members of the library. Thus most of the valuable contributions remained underutilized due to restrictions and limitations of accessibility to the research documents. Moreover, collection of

these doctoral theses is kept in the reference sections of the library where usage of the document is restricted.

## **Reprints**

As forestry is an interdisciplinary discipline, it was impossible to subscribe all the journals required for research in the field of forestry. Instead, the journal articles required for research were collected from various sources. Reprint providing service was one of the important services of the library. With the introduction of photocopying facility, getting the required reprint has become feasible.

From its beginning KFRI library had been collecting papers/chapters published in journals, books and seminar papers in connection with various research programmes. The papers were collected directly from its authors or from different institutions or purchased from the publishers or reprint providers like Indian National Science Documentation Centre (INSDOC) later amalgamated with National Institute of Science and Technology (NISSAT) formed National Institute of Science Communication and Resource Sharing (NISCAIR) or other libraries subscribing the journals. INSDOC's union catalogue of serials helped in locating libraries subscribing journals published in India. Sharing of the reprints among libraries was a frequently sought service. Current contents in plant and environmental science series in which contents of the core journals in plant and environmental science series, published weekly, were subscribed by KFRI library. It was a very good source for knowing the recent work carried out in the fields of plant and environmental science. As author's address was given, researchers could collect articles directly from the author. Abstracting journals like Forestry Abstracts and Forest Products Abstracts were also good sources of information. Reprint request cards were issued to the scientists to request reprints. On getting the cards duly filled up by the scientist, the librarian was sending the requests to the concerned authors and a separate register was maintained in the library for recording the process. On receipt of the reprint it was issued to the concerned scientists. Every scientist was given a catalogue cabinet for keeping the reference cards. Reprint number was also noted in the



card for using it later. Many of the libraries were not charging the readers for photocopying or postage of the requested reprints. Reprints collected from various sources for different projects at different times now form a massive collection. We find it difficult to organize them in the present form as many of the reprints are of few pages, old and brittle. These were kept in pamphlet boxes. Discolouration and tearing of the papers of many reprints further limits their readability. Digitization was the only solution for all these problems. By the digital archiving of the reprint collection of KFRI Library, a wider use of this valuable resource is expected. Now reprints are collected in e-print form and building up the reprint collection has become easy. Out of the 4000 digitized reprints 3400 have been made available for search and retrieval.

## **Digitization**

Now the researchers in national institutions and universities in India have great access to research literature due to subscription to many e-journals and scholarly databases in most of their subject areas. Some of the important Electronic Thesis and Dissertations (ETD) initiatives like Vidyanithi, INFLIBNET, Shodhganga, CSIR exploration, Krishi Prabha Indian Agricultural Doctoral Dissertation Repository and Developing Library Network (DELNET) have made theses collections of the university libraries open. Projects of ETDs increased the availability of research to the academic community worldwide, increased their exposure to potential researchers and reduced the need for added library space. ETDs helped in accelerating work flow within the university and library systems and make theses more quickly available. But theses submitted to FRI and universities in Kerala except MG University and CUSAT have not come out for public use. In the subject forestry, very few works have been openly available.

Steps involved in digitization process are hardcopy > scanner > scanned image > digitized file > metadata and archival. Computer systems with good storage capacity, scanner, and a server are basically used for content creation. Scanners like flatbed scanner, planetary scanner, Thoshiba e-studio and Canon photocopy machine are used for imaging the pages of documents.

Hard copy is scanned in 300dpi in 24 bit colour mode in Acrobat Professional and saved as pdf file. Then the file is converted to jpeg format to reduce the file size. There upon the jpeg file is again combined to pdf. Pages are cropped, cleaned, aligned and book marked. E-document of theses is bookmarked to facilitate internal navigation. Pages of contents and abstracts are processed with Optical Character Recognition (OCR) to facilitate word search inside the document. Digital collections of theses and reprints are organized subject wise in different collections. Priority is given to digitize the reprints purchased from INSDOC. Most of these reprints are scanned using the flat bed scanner as many of the reprints are of few pages and very old, torn and brittle. So more processing had to be done by using Photoshop tools. Reprints having more pages were scanned with auto feed scanner like canon photocopy machine after removing the stitch. The digitized files are brought to pdf and these pdf files are linked to the database developed.

## **Databases**

For convenience, the databases of theses and reprint collections were initially developed in CDS/ISIS separately. The database developed in CDS/ISIS was shifted to MS Excel and then to CSV (Comma Separated Values) format to implement in website. Free and open server technology APACHE-PHP was used for web portal. The main components of WAMP are Windows, Apache, MySql and PHP compiler. All these are open source packages except MS Windows. The server mechanism is implemented in local server for institutional use.

# RESULTS AND DISCUSSIONS

## KFRI Library Portal

Library portal is a window through which all scientists and researchers can access the theses and reprint collections from all locations of KFRI. It is developed in Wordpress and links to each collection is provided separately.

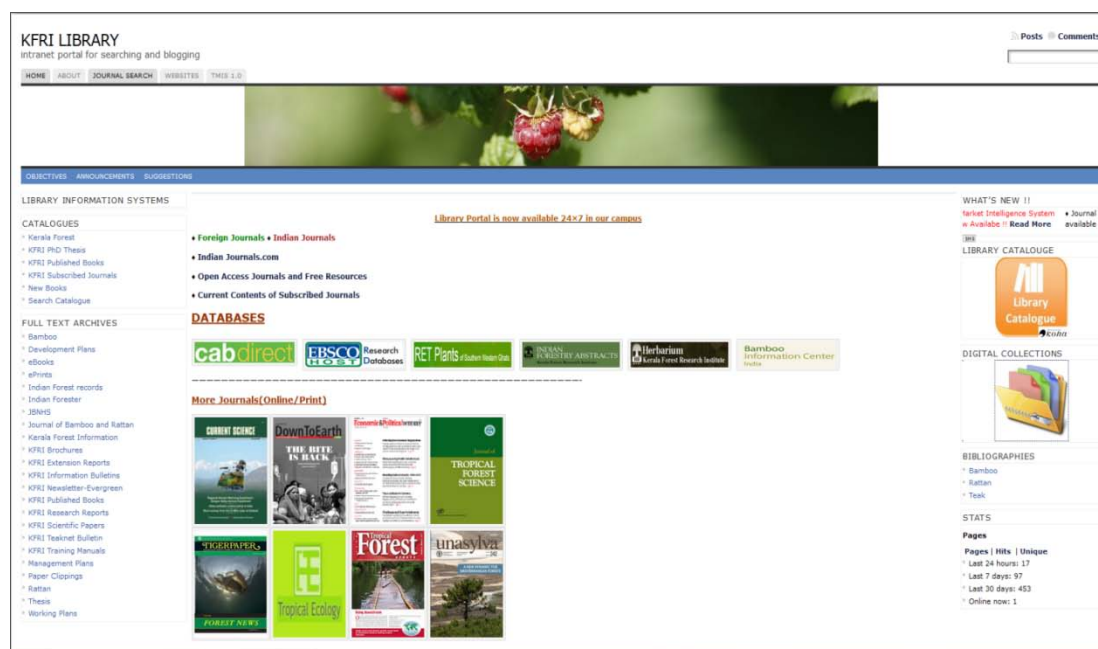
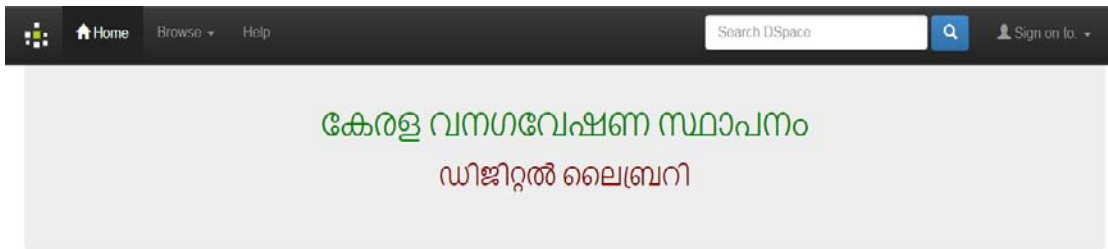


Fig.1 KFRI Library Portal

## Dspace

Commonly used software for organizing digital documents are Dspace, Eprints and Greenstone, which are valuable software free under open source licenses and there are many other packages also. We have used Dspace as it is more advantageous and more accepted when compared to Greenstone and Eprints. This is our first attempt in using Dspace and later other collections are also brought to this software.



Communities in DSpace	Discover	Subject	Date issued
Choose a community to browse its collections.	Author		
<b>Eprints</b> (3228)	Mathew, George (180)	Kerala (1117)	2000 - 2017 (3085)
Indian Forest Records (436)	Sasidharan, N (139)	Western Ghats (388)	1900 - 1999 (2793)
KFRI Research Reports (538)	Mohanan, C. (121)	India (372)	1094 - 1099 (4)
KFRI Scientific Papers (1607)	Bhal, K.M. (111)	Teak (368)	
Management Plans (15)	Sharma, J.K. (106)	Tectona grandis (147)	
<b>Ph.D. Theses</b> (112)	Hosagoudar, V.B. (105)	Wayanad (127)	
	Balasundaran, M. (104)	Idukki (125)	
	Jayson, E.A. (97)	Nilambur (118)	

**Fig.2 Dspace Front page**

DSpace is selected as it is an open source software for digital library and is designed for digital archival of documents. It is capable of searching and retrieving items by using basic or advanced search options. It is also possible to browse items by title, author, subject, etc. It provides tools for management of digital assets, and is commonly used for building institutional repositories. It helps to create, index and retrieve various types of digital contents and helps to organize photographs, films, audio/videos, presentations and other forms of contents. The collections in DSpace is organised into communities, collections and items. An item is a deposited object of any type: a published article, an image, audio or videofile . Related items are grouped into collections and related collections are grouped into communities. DSpace supports to add descriptive metadata fields such as Author, Title, Year, Publisher, Series/Report No., Subject Keywords, Abstract, etc. It has facility to acquire materials from network through the DSpace users. The system supports importing of bulk metadata/contents of digital objects, weed out and to delete items from the collection.

<a href="#">Agroforestry</a> [3]	<a href="#">Non Wood Forest Products</a> [1]
<a href="#">Bamboo</a> [13]	<a href="#">Palms</a> [1]
<a href="#">Biotechnology</a> [1]	<a href="#">Plant Physiology</a> [1]
<a href="#">Eucalyptus</a> [3]	<a href="#">Rattan</a> [1]
<a href="#">Forest Botany</a> [4]	<a href="#">Rubberwood</a> [2]
<a href="#">Forest Ecology</a> [12]	<a href="#">Sacred Groves</a> [1]
<a href="#">Forest Economics</a> [6]	<a href="#">Sandal</a> [3]
<a href="#">Forest Entomology</a> [13]	<a href="#">Seed Storage</a> [1]
<a href="#">Forest Management</a> [1]	<a href="#">Soil Science</a> [2]
<a href="#">Forest Pathology</a> [7]	<a href="#">Teak</a> [18]
	<a href="#">Wildlife Biology</a> [15]

**Fig. 3 Collections in the Community Theses. Number in brackets indicates number of records**

This component carries out the indexing and storage of documents and metadata for efficient search and retrieval. The key process involved in this component is the assignment of the metadata (bibliographic information) to each document. Title, author, year and name of the guide and keywords are provided for each thesis. Each thesis is book marked to facilitate internal navigation.

Agroforestry	16	General	26
Bamboo	27	GIS & Remote Sensing	45
Biochemistry	23	Instrumentation	2
Biodiversity Conservation	46	Mahogany	4
Biotechnology	9	Mangroves	7
Birds	113	Medicinal and Aromatic Plants	70
Climate Change	16	MFP	5
Environment	58	NWFP	8
Forest Botany	455	Physiology	10
Eucalyptus	37	Rattan/Cane	5
Fishes	101	RET species	57
Forest Ecology	95	Sacred Groves	25
Forest Economics	24	Sandal	8
Forest Entomology	258	Seeds	19
Forest Genetics	18	Silviculture	8
Forest Management & Information System	17	Socio economics	2
Forest Pathology	316	Soil Science	81
Forest Plantations	11	Teak	530
Forest Policy	8	Tribes	61
Forest Protection	15	Weeds	4
Forestry	85	Wildlife	199
Forest Statistics	22	Wood Science	106
		Zoology	177

**Fig. 4 Collections in the Community Reprints. Number indicates number of records.**

## Search

Search: PhD. Theses ▼

for peppara wildlife sanctuary Go

Current filters: Title ▼ Contains ▼ peppara X

Start a new search

Add filters:  
Use filters to refine the search results.

Title ▼ Equals ▼  Add

Results/Page 10 ▼ | Sort items by Relevance ▼ In order Descending ▼ Authors/record All ▼ Update

Results 1-2 of 2 (Search time: 0.004 seconds).

[previous](#) **1** [next](#)

Item hits:		
Issue Date	Title	Author(s)
1997	<a href="#">Ecological studies of the forest of Peppara wildlife sanctuary using remote sensing techniques</a>	<a href="#">Varghese, A.O.</a>
1998	<a href="#">Studies on man-wildlife interaction in Peppara wildlife sanctuary and adjacent areas, Trivanum district, Kerala.</a>	<a href="#">Christopher, G.</a>

Home Browse Help

Sign on to: ▾

KFRI LIBRARY / PhD. Theses / Forest Ecology

Please use this identifier to cite or link to this item: <http://hdl.handle.net/1/1780>

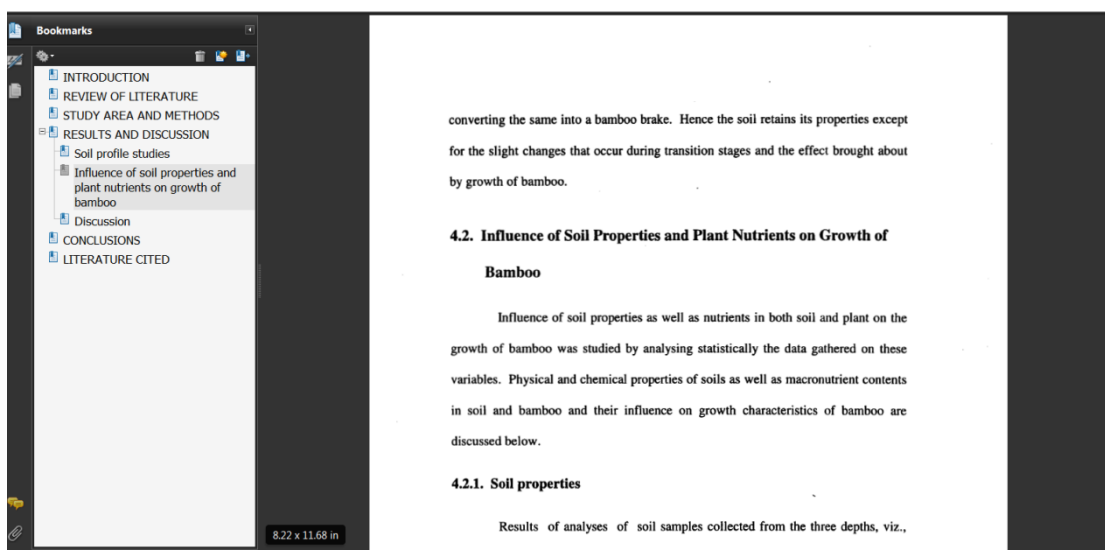
Title:	Ecological studies of the forest of Peppara wildlife sanctuary using remote sensing techniques
Authors:	Varghese, A.O.
Keywords:	Peppara wildlife sanctuary remote sensing techniques
Issue Date:	1997
URI:	<a href="http://localhost/xmlui/handle/1/1780">http://localhost/xmlui/handle/1/1780</a>
Appears in Collections:	Forest Ecology

Files in This Item:

File	Description	Size	Format	
FOREST ECOLOGY_13.pdf		16.65 MB	Adobe PDF	<a href="#">View/Open</a>

**Fig.5 Display of search results**

In the case of reprints metadata of its author, title, source, year and keywords are provided. Full text is linked to respective records in the database of theses and reprints. Database with full text is uploaded in the KFRI Library portal. Since most of the reprints in the collection are having copy right, making the facility open to the public is not possible. Universities are having the copy right of the theses submitted to universities. Digitised documents organized in different categories can be searched by individual fields such as author, title words, keywords, etc. or combined search is also possible in all the fields. Hits of records are displayed and the name of the file is displayed with each record. Digitised documents are attached to respective records in the database. Retrieved records show PDF icons clicking upon the e-document will be opened. Bookmarks in e-books enable internal navigation.



**Fig. 5** Display of full text



## **CONCLUSION**

KFRI library initiated the programme of digitising the valuable materials theses and reprint collections in the library for its preservation as well as for wider use of the collections. Access to theses were generally limited and these were not available as easy as other documents. Most of the libraries were not allowing even photocopying, lending or distribution of theses and they were often difficult to obtain them in full text. In the case of reprints, some of the reprints were very rare, old and brittle and of very small document difficult to manage. Digitization is the only solution for organizing and managing the collection for retrieval. It is found easy to locate them and the librarians could be liberated from the botheration of missing of document. As it is organized subjectwise, browsing the records in each subject is also possible. Updating is also found very convenient.

As a result of digitization, the number of people coming to refer documents has reduced significantly. Many libraries have taken or taking steps to convert library to a learning commons. Where physical library collection in many places are getting in e-form and converting to reduce the physical collection to the absolute minimum. Central repository of collection can be made accessible online. KFRI library is also on the way to digitalization and all the printed materials can be kept closed for access and the digital materials can be made available open. Instead of coming to library for reference work, library resources are to be made reach able to the prospective readers.

## List of Theses

1. Abdul Kader, S. 2002. Seed longevity and storage of mahogany (*Swietenia macrophylla* King) and Hopea (*Hopea parviflora* Bedd.)
2. Ajith Kumar, N. 1985. Impact of the Working of the Kerala State Bamboo Corporation in the development of the Bamboo Industry in Kerala
3. Ajith Kumar, P.K. 1998. Socio economic impact of upland management on downstream villages: A case study of Bharathapuzha river basin
4. Akwasi Asamoah, Frimpong-Mensah, Kwasi. 2009. Efficacy of *Tectona grandis* (Teak) and *Piptadeniastrum africanum* (Dahoma) Heartwood Water Extracts On Durability of Ten Ghanaian less Used Timber Species
5. Alone, Rajesh Anandrao. 2014. Biomass, Carbon Stock And Carbon Sequestration In An Age Series Of Teak Plantation In Tropical Environment
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28. Indira, E.P. 1999. Studies on the variability of the species *Gmelina arborea* Linn
29. Induchoodan, N.C. 1996. Ecological studies on the sacred groves of Kerala
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31. Jayahari, K.M. 2008. Ecology and behaviour of small mammals in the Western Ghats of Kerala, Southern India, with special reference to rodents

32. Jayakumar, R. 2003. Studies on the angiosperm flora and its diversity in the New Amarambalam Reserved Forests of Nilgiri Biosphere Reserve, Western Ghats of India
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