

# DEVELOPMENT OF INDIAN AGRICULTURAL LIBRARIES FROM NATP TO NAIP WITH SPECIAL REFERENCE TO INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATIONS

**Sunil Gorla**

Assistant Librarian (Selection Grade), G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand, India.

## ABSTRACT

*The paper discusses the application of Information and Communication Technology (ICT) in Indian Agricultural Libraries (IAL) from NATP (National Agricultural Technology Project) to NAIP (National Agricultural Innovation Project) which are World Bank funded projects for Indian National Agricultural Research System (INARS). NATP project was launched in the year 1998 by Indian Council of Agricultural Research (ICAR) with the aim of strengthening the INARS. ICAR realized the urgent need for strengthening the IAL i.e. Libraries of ICAR Institutes and State Agricultural Universities to achieve the mandate of NATP project. NAIP was launched by ICAR in 2006 with the main focus on consortium based activities in agriculture sector of India. Under NAIP, important projects of Component-1 i.e. CeRA (Consortium of electronic Resources in Agriculture), Krishi Prabha, e-Granth, AGROWEB have been critically examined. Impact of NATP and NAIP on IAL has been discussed the paper to know the status and scope of improvement in the ICT based library and information services of IAL.*

**KEYWORDS:** Indian Agricultural Library, NATP, NAIP, CeRA, Krishi Prabha, e-Granth, AGROWEB

## Introduction

Agriculture is backbone of the Indian economy and source of livelihood for millions of the Indian families. India is an agriculture-based economy having 329 million hectares of land area; of which 143 million hectares area is cultivated. About 65-70% population of the country is directly or indirectly depended on agriculture. The ICAR is an autonomous organization under the Department of Agricultural Research and Education, Ministry of Agriculture, Government of India. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July, 1929 as a registered society under the Societies Registration Act, 1860. ICAR is the apex body of INARS. INARS includes 45 Institutions, 6 National Bureaux, 25 Directorates/Project Directorates, 17 National Research Centres, 61 All India Coordinated Research Projects, 17 Network Projects, 569 Krishi Vigyan Kendras (KVKs, i.e. Farm Science Centers), 1 Central Agricultural University, 4 Deemed Universities and 47 State Agricultural Universities (SAUs) for agricultural research, education and extension activities in the country.

Under INARS every institute/centre/university has the library/information centre to fulfill the information requirements of the students, teachers, researchers and other users. These libraries have been playing vital role in research, extension and education in the field of agriculture in the country. The main objective of this article is to examine the development of Indian Agricultural Libraries (IAL) in terms of automation, networking, use of Internet, online resources, website development, management of in-house activity through computer etc. after the financial assistance of World Bank through NATP and NAIP. This article is based on the information collected from the IAL, ICAR and NAIP website and other documentary sources.

### **Overview of the Past Efforts**

The scientific achievements in the field of agriculture, by attaining green, yellow and blue revolutions, have made India a leading nation in the field of Agriculture at international level. In the past, many committees were appointed ([Jain & Gorla, 2001](#)) to meet the challenges of providing agricultural information like Ralph R. Shaw and D.B. Krishna Rao committee, Randhawa committee, Dorthy Parker committee etc. Development of an integrated information system and databases through an electronic network linking INARS institutions to support planning and management of agricultural research and education was recognized by ICAR Review Committee ([Indian Council of Agricultural Research, 1988](#)), and development of a computerized satellite-based Information Network "ICARNET" was recommended. In 1991, the development of a computer based network ARIS (Agricultural Research Information System) was initiated by ICAR. In 1997, the ICAR realized the urgent need for strengthening the library and information services of its Institutes and SAUs' libraries. It appointed Dr. Edith Hesse, a World Bank Consultant, to review the existing situation in agriculture libraries and then to develop a conceptual model to ensure that IALs work together to provide relevant information services to their researchers, decision makers, extension workers, students, farmers etc. In this context manpower and infrastructure requirements and the need of short and medium term training were also assessed. [Hesse \(1997\)](#) addressed all these issues regarding telecommunication, software and hardware and the role of the National Agricultural Library with specific recommendations. The major ICT developments in the field of Indian agriculture as well as in IAL have been achieved under two World Bank funded projects i.e. NATP (National Agricultural Technology Project) and NAIP (National Agricultural Innovation Project).

### **National Agricultural Technology Project (NATP)**

NATP funded by World Bank was launched in 1998 with the aim of strengthening the India's Agriculture Research System. NATP was initiated in close cooperation with ICAR institutions, SAUs and other organizations. Information System Development (ISD) was sub-component under NATP. Agricultural Research Information System (ARIS) and Library Improvement & Networking (LIN) were supported under ISD. [Agricultural Research Information System \(1999\)](#) mentioned the major objectives of the ISD modules, namely ARIS and LIN, which are:

- To make information available to the managers and scientists who will use it.
- To improve the capacity of researchers and research organization to organize, store and retrieve information relevant to their mandates.
- To develop regular procedures and mechanisms for those organizations to share information.
- To improve the capacity to plan, monitor and evaluate research programmes.

- To strengthen the network of libraries at national level in the electronic era.

Under [NATP in 1999](#), the meeting of the IAL was held at ICAR headquarters, with the objective to discuss and to formulate the policy of library automation and digitization. It was decided in the meeting that IAL should compile national union catalogue of periodicals, train library professionals in modern ICT, share AGRIS database responsibility, prepare M.Sc. and Ph.D. theses database along with abstract, develop the collection of regional libraries, prepare plan for modernization and digitization of each IAL etc. The NATP was implemented in IAL in the following manner:

**A) Categorization of the Libraries:** IALs vary in terms of size, collection, infrastructure and location. Some of the libraries are very small and some of the libraries are very large. Geographic location is also one of the important factors in determining the information needs of the agricultural scientists. Information is an important component, which needs to be given high priority by building relevant resources for meeting the multi-dimensional information demand of the users. In order to meet the information requirement of the scientists at national level, 18 IAL in different regions of the country were selected and given the status of "Regional Libraries (RLs)" as mentioned in Appendix-1.

**B) Financial Support:** Under the NATP sub-project, LIN, 120 IALs were benefitted for strengthening their resources, infrastructure and developing competency in handling the information technology, so that the resources could be utilized at national level in an economic manner. Under the project, 36 SAUs, and 84 ICAR Institutes have been provided funds for the purchase of foreign journals, electronic databases, purchase of hardware and software, renovation, and digitization. More than Rupees 500 million was allotted for strengthening the library and information system of these libraries. Regional libraries were provided sufficient funds (about 70%). These funds were utilized for renovation of infrastructure, subscription to foreign journals, network development, Internet connectivity, procurement of hardware and software along with arrangement for training to develop the human resource.

**C) Foreign Journals and CD-ROM Databases Subscription:** The most important function of the IAL is to provide recent information available in journals to the Scientists and scholars. Due to the lack of requisite grant; the number of journals available in IAL had been decreasing almost every year. Most of the libraries were forced to go for considerable cut in their subscription of foreign journals because of price rise every year and budget scarcity. Many foreign core journals could not be subscribed in IAL. Several important journals began to be subscribed through NATP funds. Under NATP about 50% funds were utilized on subscription of foreign journal in IAL. In order to know the status of foreign journals subscription in RLs, the data of printed foreign journals subscribed by the RLs were collected and analyzed. It was found that a total 747 foreign titles were being subscribed in these libraries, out of which 59.97% (448) titles were subscribed at single place, while 40.03% (299) titles were subscribed at multiple places in RLs. There was considerable duplicate subscription of foreign journals in IAL.

The IALs were provided with sufficient funds to purchase the bibliographical databases on CD-ROM. Users are able to retrieve bibliographical information needed for their research work with abstracts. CABI Abstracts (Centre for Agriculture and Biosciences

International), AGRIS (International Agricultural Information System), AGRICOLA (**AGRICultural On-Line Access**), Biological Abstracts, FSTA (Food Science and Technology Abstracts) etc., bibliographical databases were purchased by regional libraries from NATP grant. About 23% amount was spent on CD-ROM Databases subscription in IAL.

**D) Network Development:** Realizing the potential of Web and online information, the ICAR provided sufficient funds for developing the network to access the e-resources, and computerization of in-house activities for better management of the library. Funds for the purchase of hardware and software were provided under the NATP. IAL purchased servers and workstations for strengthening of "Library and Information System" and created LAN (Local Area Network) under client server environment to facilitate the local and remote users for consultation of literature.

Most of the IALs purchased the "Library Management Software" package in order to run in-house activities of the library like Circulation, Serial Control, Procurement, Cataloguing and OPAC (On-line Public Access Catalogue) by using Computer in order to improve their efficiency. In India, most of the libraries have been using LibSys and SOUL software for the management of in-house activities. In RLs, LibSys is used about 54% and SOUL by 23% and rest are using others software packages. Most of IALs have digitized their catalogues. In many IALs, circulation of documents is being done through bar-code technology. Regional libraries have digitized the abstract of Ph.D. thesis submitted to their universities/institutes and linked it with the database. Full text rare documents in public domains were digitized at some places for their use in distributed network.

The libraries got Internet facility from NATP grant. Some of the RLs were started to access e-resources. The Internet connectivity with sufficient bandwidth is the primary need to fulfill the information need. Considering this scenario IAL were provided the Internet connection through dial up mode, leased line, ISDN line, and VSAT link based on their requirements. At certain places exclusive Internet connection for libraries were provided under the support of NATP for easy access of online resources.

**E) ICT Training for Library Professionals:** In changing scenario of digital information and multi-functional library environment, the skill of library professionals need to be provided with appropriate training, qualification and experience to handle ICT demands. Library professionals require the knowledge of modern ICT to handle the information retrieval activities on computer. ICAR realized the importance of training to be imparted to working librarians at ICAR institutes and SAUs. In NATP project, training programmes were organized and about 250 library professionals were trained to meet out the new technological demand. Most of the trainings were organized under close coordination with INFLIBNET (Information and Library Network), Ahmedabad.

### **National Agricultural Innovation Project (NAIP)**

After the successful implementation of NATP, the ICAR has launched National Agricultural Innovation Project (NAIP) on July 26, 2006 by Union Minister for Agriculture to fulfill the Government of India's objectives on National Policy on Agriculture (NPA). NAIP accords high priority to generation and transfer of agricultural technologies, and suggests innovations in the technology system. The National Policy on Agriculture of India seeks to actualize the vast untapped growth potential of Indian agriculture to generate income and employment opportunities for the rural communities. It recognizes

the role of private sector in agricultural research, human resource development, post-harvest management and value-addition. The Indian Council of Agricultural Research (2006) mentioned that NAIP is planned for 6 years to allow time for piloting, learning and scaling-up, wherever possible. The total budget is estimated US \$ 250 million for NAIP. In the budget provision, the World Bank has been funding US \$ 200 million as credit and US \$ 50 million is funded by the Government of India.

The overall objective of the NAIP is to facilitate an acceleration and sustainable transformation of the Indian agriculture so that it can support poverty alleviation and income generation through collaborative development and application of agricultural innovations by the public organizations in partnership with farmers' groups, the private sector and other stakeholders. As per the website of NAIP (<http://www.naip.icar.org.in>), the NAIP has been functioning through following four components:

**Table 1: Components Under NAIP**

Component No.	Component Title	Amount Allotted in US \$
1.	The ICAR as the Catalyzing Agent for the Management of Change in the Indian NARS	\$ 46 million
2.	Research on Production to Consumption Systems (PCS)	\$ 75 million
3.	Research on Sustainable Rural Livelihood Security (SRLS)	\$ 73 million
4.	Basic and Strategic Research in the Frontier Areas of Agricultural Sciences (BSR)	\$ 56 million
Total Amount		\$ 250 million

The aim of component-1 is to bring in the organizational changes in the INARS so that it becomes a dynamic innovation system capable of responding to the present as well as the future needs of Indian agriculture research and development. The role of the ICAR as the leader of the INARS is to formulation as a catalyzing agent of the change with the agricultural universities being the main partners in change. The following areas have been identified by [Indian Council of Agricultural Research \(2006\)](#) under Component-1.

- Information, Communication and Dissemination Systems (ICSD) which support interactions and dialogue among the stakeholders.
- Learning and capacity building (L&CB).
- Business planning and development for agricultural technologies and knowledge.
- Policy analysis including that for gender concerns, visioning and market intelligence analysis for supporting the policy makers on one hand and the farmer on the other.
- Remodeling the financial and procurement systems of the ICAR and SAUs which suit an innovation system.

Various projects as mentioned in table 2 have been sanctioned under Componet-1 of NAIP.

**Table 2: Projects Working Under Component-1 of NAIP**

<b>Area</b>	<b>Name of the Project</b>	<b>Lead Institution/ Proponent</b>
Information Communication & Dissemination	KrishtiPrabha-Indian Agricultural Dissertations Repository	Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar
Information Communication & Dissemination	Consortium for e-Resources in Agriculture (CeRA)	Indian Agricultural Research Institute (IARI), New Delhi
Information Communication & Dissemination	Strengthening of digital library and information Management under INARS (e-GRANTH)	Indian Agricultural Research Institute (IARI), New Delhi
Information Communication & Dissemination	AGROWEB- Digital Dissemination System for Indian Agricultural Research (ADDSIAR)	National Bureau of Plant Genetics Resources (NBPGR), New Delhi
e-Courses development	Development of e-Courses for B.Sc.(Agriculture) degree programme	Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamilnadu
e-Courses development	Development of e-Courses for B.V.Sc. & A.H. degree program	Tamil Nadu Veterinary & Animal Science University (TNVASU), Chennai
e-Courses development	Development of e-Courses for B.F.Sc. degree programme	Karnataka Veterinary Animal and Fisheries Sciences University (KVAFSU) Mangalore, Karnataka
e-Courses development	Development of e-Courses for B.Sc.(Horti.) degree programme	University of Agricultural Sciences (UAS), Bangalore
e-Courses development	e-Home Science Courseware consortium	Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
e-Courses development	Development of e-Courses for B.Tech (Dairy Technology) degree Programme	National Dairy Research Institute (NDRI), Karnal
Knowledge sharing & management	Re-designing the Farmer-Extension-Agricultural Research/ Education Continuum in India with ICT-mediated Knowledge Management	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad
Knowledge sharing & management	e-Publishing & Knowledge System in Agricultural Research	Directorate of Information & Publication in Agriculture (DIPA), New Delhi
Knowledge sharing & management	Development and maintenance of Rice Knowledge Management Portal	Directorate of Rice Research (DRR), Hyderabad
Knowledge sharing & management	Mobilizing mass media support for sharing agro- information	Directorate of Information & Publication in Agriculture (DIPA), New Delhi
Management Information System	Developing a Decision Support System for Agricultural Commodity Market Outlook	National Centre for Agriculture Economics & Policy Research (NCAP), New Delhi
Management	Decision Support System for	Central Soil Salinity Research Institute

Information System	Enhancing Productivity in Irrigated Saline Environment using Remote Sensing, Modeling and GIS	(CSSRI), Karnal
Management Information System	Implementation of Management Information System (MIS) including Financial Management System (FMS) in ICAR	Project Implementation Unit (PIU)-NAIP
Management Information System	Development of ICT Based Tools/Technology towards an Interactive Multimedia Agriculture Advisory System	Indian Institute of Technology (IIT-M), Madras, Rural Technology and Business Incubator (RTBI))
Management Information System	Developing, Commissioning, Operating and Managing an online Examination system for NET/ARS-Prelim Exam by ASRB, ICAR.	Agricultural Scientists Recruitment Board (ASRB), ICAR, New Delhi
Technology Management	Zonal Technology Management and BPD Unit at CIRCOT, Mumbai	Central Institute of Research on Cotton Technology (CIRCOT), Mumbai
Technology Management	Zonal Technology Management and BPD Unit at IARI, New Delhi	IARI, New Delhi
Technology Management	Zonal Technology Management and BPD Unit at CIFT, Cochin	Central Institute of Fisheries Technology (CIFT), Cochin
Technology Management	Zonal Technology Management and BPD Unit at IVRI, Izatnagar	Indian Veterinary Research Institute (IVRI), Izatnagar
Technology Management	Zonal Technology Management and BPD Unit at NIRJAFT, Kolkata	National Institute of Research on Jute & Allied Fibre Technology (NIRJAFT), Kolkata
Business and Marketing	Business Planning and Development (BPD) Unit at Anand Agricultural University (AAU), Anand	Anand Agricultural University (AAU), Anand
Business and Marketing	Business Planning and Development (BPD) Unit at Chaudhary Charan Singh Haryana Agricultural University (CCSHAU),	CCSHAU, Hisar
Business and Marketing	Business Planning and Development (BPD) Unit at Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur	Jawaharlal Nehru Krishi Viswavidyalaya (JNKVV), Jabalpur
Business and Marketing	Business Planning and Development (BPD) Unit at Tamil Nadu Agricultural University (TNAU), Coimbatore	TNAU, Coimbatore
Business and Marketing	Establishing and Networking of Agricultural Market Intelligence Centres in India	TNAU, Coimbatore
Business and Marketing	Business Planning and Development (BPD) Unit at Birsa Agricultural University (BAU), Ranchi	Birsa Agricultural University (BAU), Ranchi

Business and Marketing	Handholding and Mentoring of BPD units of INARS	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad
Policy	Visioning, Policy Analysis and Gender (V-PAGe)	NCAP, New Delhi
Policy	Policy and Institutional Options for Inclusive Agricultural Growth	IARI, New Delhi
Capacity Building	Learning and Capacity Building (L&CB)	National Academy of Agricultural Research & Management (NAARM), Hyderabad
Capacity Building	Assessment of future human capital requirements in agriculture	NAARM, Hyderabad
Capacity Building	Innovations in Technology Mediated Learning: An Institutional Capacity Building in using Re-usable Learning Objects in Agro-horticulture	Yashwantrao Chavan Maharashtra Open University (YCMOU), Nashik
Climate Change	Assessment of Impact of Climate Change on Water-Energy Nexus in Agriculture Under Canal Irrigation System	Indian Institute of Management, Ahmedabad
Statistics	Strengthening Statistical Computing for INARS	Indian Agricultural Statistical Research Institute (IASRI), New Delhi

In the area of information communication and dissemination, the emphasis is given on sharing the knowledge of ICAR Institutions and SAUs Libraries under consortium mode. Important projects related to information dissemination are discussed below.

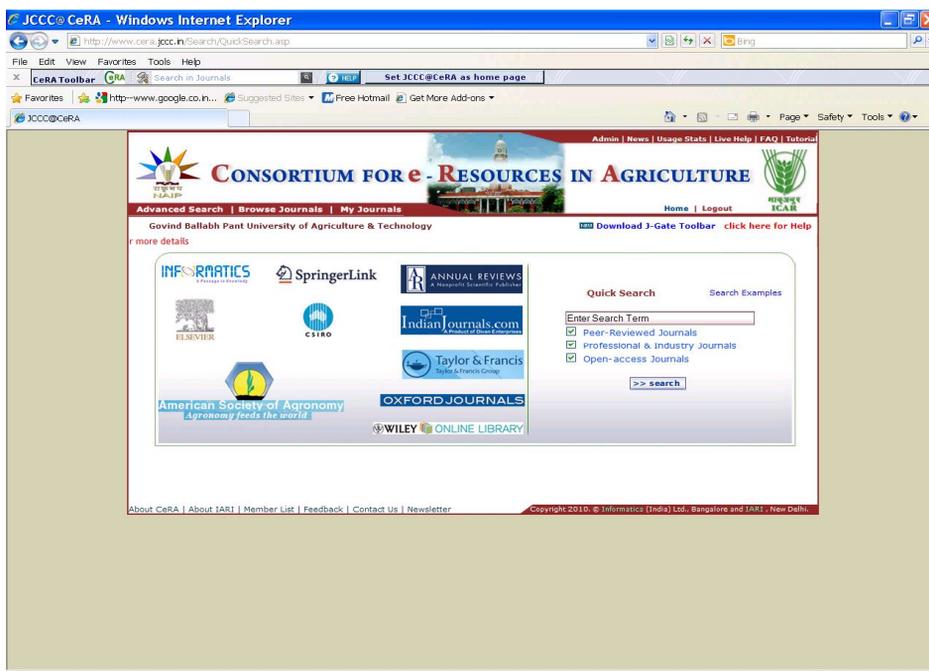
#### **Consortium for e-Resources in Agriculture (CeRA)**

NAIP has established the CeRA at the Indian Agricultural Research Institute (IARI) for providing access of online journals to 126 IALs in the first phase. The CeRA project has been planned for 5 years from 2007-08 to 2011-12 with the estimation of total cost of Rs. 938.542 lakhs. The main objectives of CeRA mentioned by Indian Agriculture Research Institute (2009) are:

- To develop the existing Research & Development information resource base of ICAR institutes/SAUs, etc., comparable to that existing in leading institutions/organizations of the world.
- To create an e-access culture among scientists/teachers in ICAR institutes/agricultural universities.
- To develop a Science Citation Index (SCI) facility at IARI for evaluation of scientific publications.
- To assess the impact of CeRA on the quality of research publications measured through SCI.

CeRA project has been implemented under the leadership of Unit of Simulation and Informatics of IARI to fulfill the above mentioned objectives. Presently, more than 2000 online agricultural science journals of Springer, Elsevier, Taylor & Francis, Annual Reviews, IndianJournal.com and Commonwealth Scientific and Industrial Research Organisation (CSIRO) on Agricultural Sciences are being accessed by 126 IALs under

CeRA project, as shown in Figure-1. Under CeRA, document delivery service has been started to fulfill the information need of researchers in INARS. The content management of CeRA has been done by Informatics, Bangalore. Informatics has developed JCCC website for single window search for all the e-resources under CeRA. The CeRA e-resources can be accessed under IP (Internet Protocol) based system. The use statistics is also maintained under CeRA for impact assessment.



**Figure 1:** Homepage of Consortium for e-Resources in Agriculture (CeRA)

### **Krishi Prabha: Indian Agricultural Dissertations Repository**

The project has been executed under the leadership of University Library, CCS Haryana Agricultural University Library; Hisar (<http://202.141.47.8:8080/HAU/projects-krishi.html>) with the aim to digitize all Ph.D. theses submitted during the year 2000 to 2007 to all SAUs and deemed agriculture universities. Initially the project was planned for 2 years from Nov. 2007 to Nov. 2009 with the total cost of Rs. 124.33 lakhs. The main objectives of Krishi Prabha are:

- i. To develop, organize and sustain knowledge base of Indian Agricultural Dissertations in digital form and make it accessible on-line.
- ii. To develop a standard format for submission of e-theses to the SAUs/DUs.
- iii. To upgrade skills of human resources of SAUs/DUs.
- iv. To publish a journal in electronic form/ hard copy form from the Database.

The entire work of digitization has been outsourced to a common agency for maintaining uniformity and standard protocol. The digitization work has been done at different locations of the SAUs/DUs. The full text database includes about 7500 digitized theses. The digitized theses material after editing, organizing, value addition etc. are available online through IP based system. It is assumed that after the completion of the project

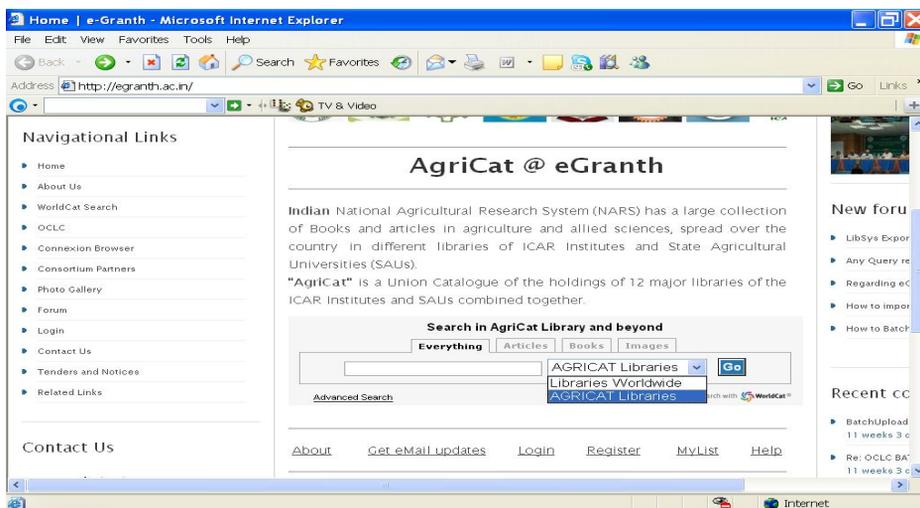
after 2007 all the theses will be available in digital form at SAUs/DUs of India. Now agricultural universities of India have started to take the digital copy theses along with the hardcopy.

### **e-GRANTH: Strengthening of Digital Library and Information Management under INARS**

e-GRANTH subproject under component-1 of NAIP is launched under the leadership of IARI. As mentioned on the website of e-Granth (<http://egranth.ac.in>), the project is planned to strengthen digital libraries and information management of 12 different research institutes and agricultural universities of INARS with WorldCat of Online Computer Library Center (OCLC) partnership. WorldCat has been maintained by OCLC as online union catalogue of 10000 libraries of world. e-Granth provides digital access to resources of 12 libraries which include OPAC, important institutional repositories, rare documents and makes them publicly accessible over internet under NARS. The project has been planned for 3 years at the cost of Rs. 861.481 lakhs with following objectives:

- i) To create Online Public Access Catalog (OPAC) under "Indian Agricultural Research Group Catalogue" of all 12 library resources with (OCLC partnership).
- ii) To digitize important institutional repositories (limited to IARI, New Delhi; IVRI, Izatnagar; ANGRAU, Hyderabad and UAS, Bangalore) including rare books and old journals and make them open access under INARS.
- iii) To strengthen capacity building for library and information management system (open to all libraries of INARS).

All the 12 participant libraries have initiated the work of standardizing their OPAC in MARC-21 through online WorldCat with the help of Connexion software of OCLC. Eleven libraries out of these twelve are using LibSys software as a Library Management System. OPAC data of all the participant libraries will be searchable through WorldCat or AgriWorldCat as online union catalogue as seen in Figure 2. Presently, the development of institutional repository is at the initiation stage under e-Granth.



**Figure 2: Homepage of e-GRANTH**

**AGROWEB: Digital Dissemination System for Indian Agricultural Research**

AGROWEB is launched under component-1 of NAIP for establishing a consortium for ADDSIAR under the leadership of National Bureau of Plant Genetic Resources (NBPGR), New Delhi. It will enhance the effectiveness of ICAR's web-based dissemination and publishing platform by exploiting new generation Web 2.0 technologies. This can be catalyzed through dynamic web presence of ICAR institutions. The AGROWEB is planned for 2 years with the following objectives as discussed by [Agrawal et al. \(n.d.\)](#) at total cost of Rs 5.27 Crores.

- i. To identify standards, develop uniform guidelines, content management strategies and a model template for websites of ICAR institutes.
- ii. To develop model websites of all consortium partners to meet requirements of stakeholders.
- iii. To design and develop ICAR 'Portal' and integrating the websites of consortium partners.
- iv. To build capacity of personnel in ICAR institutes in design, development and management of websites.

There are eight ICAR Institutes (other than NBPGR) which are partners in the AGROWEB project. Open sources have been used for website content management in the project. Depending on the expertise available, the entire work has been divided amongst the consortium partners. Adaptations of latest web technologies like Web 2.0 technology are part of the project. Complete revamp of websites of all consortium partners by the uniform guidelines are developed in the project.

**Suggestions for Improvement**

There are following suggestion for further improvement of IAL under ICT environment:

- Institutional repositories should be developed by IAL through open source software like DSpace to share the research output of INARS.
- Web 2.0 services should be initiated in IAL for latest ICT based services.
- Online discussion forum for IAL should be established through e-mail server or Web 2.0 technology.
- Online Union Catalogue under e-Granth project of all the 126 IAL should be developed.
- Sustainability of national projects i.e. CeRA, e-Granth and Krishi Prabha should be planned.
- Development of semantic websites of IAL on standard platform is required to share the resources and services effectively through web.
- Training on state-of-the-art technology of ICT is required for IAL professionals to implement the new technologies.
- More online journals should be provided through CeRA to fulfill the information need of researcher.
- Bandwidth of Internet connectivity should be provided at IAL up to 20 MBPS for prompt access of online services.

**Conclusion**

The selected IALs under NATP and NAIP are mentioned in appendix-I. Central grant given to IAL under NATP has achieved the remarkable progress in the ICT application specially automation and networking of libraries. Now under NAIP these libraries have been developed websites, providing catalogue information through Web-OPAC, using

Internet for faster access of online resources and dissemination of information. IALs are now using ICT for managing in-house activities that have improved their efficiency. Online culture has been developed and it has given the staff more confidence for providing services to the users under ICT environment. Users' demands for bibliographical information are being fulfilled with the use of CD-ROM databases. Financial support through NATP and NAIP has improved resources in IAL which are required for research and education. The IAL have gained considerable progress in terms of adoption of information technology, infrastructure development, human resource development and economic resource building in electronic environment. Under NATP major funds were used for subscription of printed foreign journals from individual libraries.

In NAIP, the major funds have been utilized by librarians for providing access to online journals under consortium mode rather than providing funds to individual libraries. Under CeRA all the IAL (i.e.126) are accessing more than 2000 agricultural online journals. Under NAIP digitization of doctoral thesis under Krishi Prabha project and providing online repositories of these theses will be of great help to the Indian agricultural research scholars for selection of research topic and avoid duplication of research. In this project, submission of e-thesis at Krishi Prabha portal from 2008 is need of the hour to update e-thesis regularly. Another important achievement under NAIP is union catalogue of agricultural libraries have developed with the support of OCLC. Under this project selected 12 libraries has started submitting their catalogue information at WorldCat OCLC. Standardization of local metadata according to MARC-21 of participating agricultural libraries through OCLC is also a major challenge under this project.

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**Appendix: List of Selected IAL under NATP and NAIP**

S. N.	IAL of ICAR Institutes	Regional Library under NATP	e-Granth Partner Library under NAIP
1	Central Institute Agricultural Engineering, Bhopal	Yes	No
2	Central Institute of Fisheries Education., Mumbai	Yes	Yes
3	Directorate of Information & Publication of Agriculture (DIPA), New Delhi	No	Yes
4	Indian Agricultural Research Institute, New Delhi (Lead Center)	Yes	Yes
5	Indian Agricultural Statistical Research Institute, New Delhi	Yes	No
6	Indian Institute of Horticultural Research, Bangalore	Yes	No
7	Indian Veterinary Research Institute., Izatnagar	Yes	Yes
8	National Dairy Research Institute, Karnal	Yes	Yes
<b>IAL of SAU</b>			
9	Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad	No	Yes
10	Asam Agricultural University, Jorhat	Yes	No
11	CSK Himachal Pradesh Krishi Vishvavidyalaya Palampur	Yes	Yes
12	G.B. Pant University of Agricultural & Technology, Pantnagar	Yes	Yes
13	Gujarat Agricultural University, Anand	Yes	No
14	Indira Gandhi Krishi Vishva Vidhyalay, Raipur	Yes	No
15	Kerala Agricultural University, Thrissur	Yes	No
16	Mahatma Phule Krishi Vidyapeeth, Rahuri	Yes	Yes
17	Nehru Library, Ch. Charan Singh Haryana Agriculture University, Hisar	No	Yes
18	Orisa University of Agricultural and Technology, Bhubneshwar	Yes	No
19	Punjab Agricultural University, Ludhiana	Yes	No
20	Rajasthan Agricultural University, Bikaner	Yes	No
21	Tamilnadu Veterinary and Animal Sciences University (TanuVAS), Tamilnadu	No	Yes
22	University of Agricultural Sciences, Bangalore	No	Yes
23	University of Agricultural Sciences, Dharwad	Yes	No
	Total	18	12

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