

# Web-based Agricultural Information Systems and Services under National Agricultural Research System

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## ABSTRACT

The paper provides the brief background of the National Agricultural Research System (NARS) and the Indian Council of Agricultural Research (ICAR). It elaborates the National Agricultural Technology Project (NATP) and the components of the National Agricultural Innovation Project (NAIP) with special reference to the Component-I under which all the important and most innovative web-based projects, i.e., *KrishiPrabha*, CeRA, and e-Granth falls. The overview of these projects including objectives and deliverables has been highlighted especially keeping in view of the current scenario of the NARS institutions. It further elaborates the rationale, mission and objectives of the projects, the methodologies, and work programs. It also shows the directions and outcomes of the projects. The long term positive deliverables of the projects have also been projected.

**Keywords:** National Agricultural Research System, Indian Council of Agricultural Research, National Agricultural Technology Project, National Agricultural Innovation Project, *KrishiPrabha*, CeRA, e-Granth, e-resources consortium

## 1. NATIONAL AGRICULTURAL RESEARCH SYSTEM

The National Agricultural Research System (NARS)<sup>1</sup>, is one of the largest systems of its kind in the world, with more than 26,178 full-time equivalent research staff functioning in government, public, and higher education institutions and universities. It comprises the Indian Council of Agricultural Research (ICAR)'s 45 national institutes, 17 national research centres, 6 national bureaus, 25 directorates, and 4 national institutes with deemed university (DU) status; and one central agricultural university and 46 state agricultural universities (SAUs). About 93 per cent of the funds for NARS research and development are sourced from the government.

## 2. INDIAN COUNCIL OF AGRICULTURAL RESEARCH

The ICAR<sup>2</sup> is an autonomous apex body constituted 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 in pursuance of the report of the Royal Commission

on Agriculture. It is responsible for coordinating, guiding and managing research and education in agriculture including horticulture, fisheries, and animal sciences in the entire country. Spread across the country, this is one of the largest national agricultural systems in the world. The body is headed by the Director General, ICAR with headquarters at New Delhi. The ICAR is a pioneer in ushering the green revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of food grains, etc., thus making a visible impact on the national food and nutritional security. It has played a pivotal role in promoting excellence in higher education in the field of agriculture. It is engaged in cutting edge areas of science and technology development and its scientists are internationally acknowledged.

## 3. NATIONAL AGRICULTURAL TECHNOLOGY PROJECT

After the WTO, there were rapid global changes in agricultural trade and the National Agricultural Technology Project (NATP)<sup>3</sup> was conceived as a pilot project. It was launched in November 1998 and was an initiation of the Government of India with World Bank assistance. The

overall objective of NATP was to revitalise the agriculture technology generation assessment, refinement, and dissemination systems. Keeping in view the scope, the paper is confined to the related sub-component of the Project, i.e., Information Systems Development (ISD). A sub-component under ISD was 'Strengthening of Library Improvement and Networking (SLIN)'.

The sharing of resources through networking is regarded as the most practical way, utilising available resources to meet the increasing information requirements. The transfer and dissemination of information is key in the concept of a network at local, regional, national, and international level. The ICAR under NATP initiated in a planned way, the application of latest ICTs for Agricultural Libraries and Information System (ALIS) in the NARS around 1994. Dr S.L. Mehta, the then National Director, NATP is the pioneer in this initiative and significantly contributed in transforming the agricultural library and information system from a traditional to a web-based automated library and information system. With the NATP funds for the agricultural libraries, rapid transformations have taken place in different scientific and academic institutions in the country by way of embarking upon the computer and telecommunication based networks and electronic resource management. During the years of the project component, the NATP provided financial support for the various equipments, infrastructure facilities and for improving the information resources and services of the ICAR institutes and the SAUs.

### 3.1 NATP Grouping of Agricultural Libraries

Keeping in view the regional balance, the NATP<sup>4</sup> identified some agricultural libraries as regional libraries which are shown in the Table 1. The funds were provided from World Bank through NATP for strengthening agricultural information base, digitisation, training, CD-ROM databases, etc.

The NATP has made possible the journey of libraries from storehouses to the stage of information centres. It has changed entirely, the library automation scenario of the NARS libraries and of course the mindset of its service providers and users, especially the scientific community who is always interested to go through the latest information in their profession around the world without wasting much time and visiting the library as minimum as possible. The project has helped in making the information and the library services available on the desktops of the scientists and they are now using the library services and facilities at a time which is convenient to them and the way they want. They need not visit the library for information as the information is now available online and they need to visit the library only when they require personally reading or borrowing some document, resulting in saving the precious time of the scientific community and library staff as well.

**Table 1. Regional libraries identified by NATP**

S. No.	Region	Regional Centre
1.	North	(i) CSK HP Krishi Vishvavidyalaya (CSKHPKV), Palampur (ii) Punjab Agricultural University (PAU), Ludhiana (iii) GB Pant University of Agriculture and Technology (GBPUAT), Pantnagar
2.	North-East	(i) Assam Agricultural University (AAU), Jorhat
3.	East	(i) Orissa University of Agriculture and Technology (OUAT), Bhubaneswar
4.	West	(i) Gujarat Agricultural University (GAU), Anand (ii) Rajasthan Agricultural University (RAU), Bikaner (iii) Mahatma Phule Krishi Vishvavidyalaya (MPKV), Rahuri
5.	Central	(i) Indira Gandhi Krishi Vishvavidyalaya (IGKV), Raipur
6.	South	(i) Kerala Agricultural University (KAU), Thrissur (ii) University of Agricultural Sciences (UAS), Dharwad

## 4. NATIONAL AGRICULTURAL INNOVATION PROJECT

The NAIP<sup>5</sup> is world's second biggest World Bank-assisted agricultural project being executed by NARS with a life-span of six years. Started from 24 July 2006 to 2012. The objective of the NAIP is to facilitate an accelerated 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 organisations in partnership with farmers, private sector, and other stakeholders.



**Figure 1. NAIP website.**

The specific programmes of NAIP are:

Component 1. To build the critical capacity of the ICAR as a catalysing agent for management of change in the Indian NARS

Component 2. To promote production to consumption systems research in priority areas/themes to enhance productivity, nutrition profitability, income and employment

Component 3. To improve livelihood security of rural people living in the selected disadvantaged regions through technology-led innovation systems, encompassing the wider process of social and economic change covering all stakeholders

Component 4. To build capacity to undertake basic and strategic research in frontier areas to meet challenges in technology development in the immediate and predictable future.

Among the four components of NAIP, the Component 1 aims at bringing in the organisational changes in the NARS so that it becomes a dynamic innovation system, capable of responding to the present as well as the future needs of Indian agricultural research development. The emphasis *inter alia* is on:

- (a) Strengthening of the ICAR net
- (b) Digitised content creation and knowledge management
- (c) Strengthening of libraries of SAUs and ICAR institutes into the fully electronic libraries connected over the ICAR net
- (d) Formation of an ICAR e-journal consortium for centralised subscription of e-resources and information sharing in the agricultural domain at national level, etc.

It is important to mention that the current web-based information systems, services, networks and library-related ICT-based implementations, i.e., *KrishiPrabha*, CeRA, e-Granth, etc., have been supported through NAIP only.

## 5. KRISHIPRABHA

Doctoral research is the harbinger of scientific enquiry in all domains of knowledge which initiates the researchers into a scholarly journey to academia. The extensive background information, detailed methodology, discussions, inferences, and exhaustive bibliography make it an original and unique resource which, in most cases, may not be available in any other form. This enormous body of literature offers a wealth of information, if only they are catalogued, archived, and disseminated. But for want of institutional and organisational mechanism to archive and disseminate, the doctoral dissertations are hardly noticed or read. These resources must be preserved for the posterity and used by the contemporary scientists. Keeping in view the importance of the doctoral dissertations, the project *KrishiPrabha*<sup>6</sup>—Indian Agricultural Doctoral Dissertations Repository—was envisioned. The title '*KrishiPrabha*' has its own significance. 'Prabha' means 'morning', in other words 'beginning of the day'. Since this project is first of its kind in agricultural discipline in India; hence the title '*KrishiPrabha*' is given. It was sanctioned by ICAR under its NAIP in November 2007. The objectives of the project initially targeted to be achieved within a time limit of two years from the date of its commencement however the same was extended until March 2011 with additional funding.

### 5.1 Rationale

There are about 47 agricultural universities and 4 deemed agricultural universities in India which award doctoral degrees in agriculture and allied disciplines.



Figure 2. *KrishiPrabha* website.

These doctoral dissertations are one of the very important and valuable original sources of information. There is a need to unveil this resource to the scientists across the world. This objective can be achieved if the following steps are taken:

- (a) Indian Agricultural Dissertations Repository (IADR) is set up for the preservation of information enshrined in the dissertations for the posterity and use by the current generation;
- (b) Repository, so established, is used for evaluation of research findings, and the evaluation reports are used for further pursuit and generation of agricultural knowledge;
- (c) Same repository is utilised for the creation of electronic database of doctoral dissertations;
- (d) Database, so created, is made accessible online to the national and international users; and
- (e) Same database is further utilised for the publication of an e-journal reporting abstracts of the dissertations in order to disseminate information.

## 5.2 Scope

- (a) Digitisation of agricultural doctoral dissertations produced in India from 2000 onwards;
- (b) Maintenance of the digital library thus created;
- (c) Collection of hard copies of the old dissertations, if spare copies are available with the respective universities; and
- (d) collection of soft copies of dissertations to be produced in future for updating of the database of the digital library.

## 5.3 Objectives

The Project has been sanctioned for the achievement of the following objectives:

- (a) To develop, organise, and sustain knowledge-base of Indian agricultural dissertations in digital form and make it accessible online;
- (b) To develop a standard format for submission of e-theses to the SAUs/DUs;
- (c) To upgrade skills of human resources in SAUs/DUs;
- (d) To publish a journal in electronic form/hard copy form from the database.

## 5.4 Stakeholders in the Project

The digital library and repository was developed along a distributed cooperative model which is already functional from the Nehru Library of HAU, Hissar as the Nodal Agency. This Agency is responsible for data capturing, editing, indexing, organising, aggregating, and

other operations leading to the development and maintenance of the digital library and repository. The 51 Agricultural Universities including Deemed Agricultural Universities offering PhD degrees in agriculture and allied disciplines spread over the country serve as sources of data for this project. The entire NARS system has free access to the digital library database with full-text of PhD theses and bibliographic records of Masters' degree theses. The access is IP-based for full-text authorised users and up to abstract level for others.

## 5.5 Impact and Deliverables

The expected outcomes/deliverables of this project which have already been achieved up to great extent are:

- (a) Integrated database of abstracts already digitised by SAUs/DUs;
- (b) Digital library (full-text) of more than 10,500 Indian agricultural doctoral dissertations is available and many more are in the pipeline;
- (c) Indian agricultural dissertations repository of hard and soft copies;
- (d) Standard template for online submission of dissertations from remote locations;
- (e) Capacity building through trainings/workshops.

## 6. CONSORTIUM FOR E-RESOURCES IN AGRICULTURE

The consortium for e-resources in agriculture (CeRA)<sup>7,8</sup> is a consortium of e-journals being subscribed by ICAR and provides access to more than 126 libraries of the NARS. It is in the project mode and is functional from the country's premier national institute for agricultural research, education, and extension, i.e., IARI, New Delhi and is funded by NAIP.

Oral communication has been an integral part of people to people interactions in all civilisations. With the advancement of science and technology, the process of communication has expanded over the years to cover print and other modes like computers, mobile phones, and associated gadgets. With rapid growth of internet facilities and advancement of web technology, almost all reputed international journals are available over the network for the use of scientific community. Accordingly, the NAIP funded the CeRA at the IARI in November 2007 to facilitate accessibility of scientific journals and other resources to all researchers/users in the NARS.

### 6.1 Objectives of CeRA

- (a) To upscale the existing R&D information resource base of ICAR institutions/universities comparable to world's leading institutions/organisations;

- (b) To subscribe e-journals and create e-access culture among scientists/teachers in ICAR institutes/ agricultural universities; and
- (c) To assess the impact of CeRA on the level of research publications measured through NAAS ID and *Science Citation Index*.

## 6.2 Deliverables

- (a) Online accessibility of all important journals and other resources related to agriculture and allied sciences to researchers and students of the consortium;
- (b) Quick access to R&D information as available worldwide and permanent archive of the subscribed e-databases; and
- (c) Improvement in the quality of scientific publications, teaching and research guidance.

## 6.3 Accomplishments

- IP-based access to CeRA resources has been made available to NARS institutions and universities. Web-based URL ([www.cera.jccc.in](http://www.cera.jccc.in)) is available with easy and customised interface and facilitating the online access and document delivery. More than 2000 journals are covered.
- Subscription to all relevant and important resources from Annual Reviews, Springer, CSIRO, Elsevier, Taylor and Francis, Nature, SCI, Indian journals, Oxford, Wiley, ASA, etc. have been made available.
- Numbers of training/workshop/orientation programs have been arranged at local and national level for maximising the usage of subscribed resources.
- Researchers being assisted to access full-text of library subscribed journals (which are not available in CeRA); the Document Delivery Request System has been in place.

- CeRA maintains usage and other data for compiling the reports and further improving the system.
- Steering, monitoring cum negotiation, and working committees have been constituted and meetings are held periodically to achieve objectives of consortium.
- CeRA in collaboration with e-Granth and AALDI organised a Seminar cum User Meet on 24-25 February 2011.

## 7. E-GRANTH CONSORTIUM<sup>9-11</sup>

### 7.1 Rationale of Project

The NARS has a very large and extensive collection of repositories in the field of agriculture and allied sciences, spread all over the country in different libraries, academic institutions, museums, and in authors' collections. This invaluable heritage has to be documented, preserved and made easily accessible to end users, for which digitisation is the solution. Digitisation means acquiring, converting, storing, and providing information in a computer readable format that is standardised, organised and available on demand. Digital technology opens up a totally new perspective. The internet holds millions of websites and is a place for research, teaching, expression, publication, and communication of information. The important points as per the rationale of the project may be summarised as:

- Services too archaic in the light of ICT revolution
- Localised services
- Possible duplication of resources
- Space limitation for growth
- Staff crunch
- Staff training
- Budget constraints
- Poor visibility in catalogues, etc.



Figure 3. CeRA website.



Figure 4. e-Granth website.

## 7.2 Objectives

- To create OPAC under Indian Agricultural Research Group Catalogue of all the partner library resources with OCLC partnership;
- To digitise important institutional repositories/resources of leading NARS libraries including rare books and old journals and make them open access under NARS;
- To strengthen capacity building for library and information management system (open to all libraries of NARS).

## 7.3 Resources in Institutional Repositories

- Theses, annual reports, newsletters, success stories, special bulletins, convocation addresses, endowment lectures, faculty/scientists' profiles;
- Pre-prints, authors' collections, monographs, handbooks, course curricula, lecture schedules, lecture notes, proceedings of trainings, ppts;
- Important reports of committees, notifications, projects, statistical reports;
- Archives of heritage value such as awards, certificates, visitors' handbooks, rare photos;
- Digital objects of plant varieties, insects, nematodes, microbes, audio/video recordings, etc.

## 7.4 Consortium Composition

- Indian Agricultural Research Institute (IARI), New Delhi – Lead Centre
- Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
- Central Institute of Fisheries Education (CIFE), Mumbai

- Ch. Charan Singh Haryana Agricultural University (CCSHAU), Hissar
- CSK Himachal Pradesh Krishi Vishwavidyalaya (CSKHPKV), Palampur
- GB Pant University of Agriculture & Technology (GBPUAT), Pantnagar
- ICAR Library, ICAR, New Delhi
- Indian Veterinary Research Institute (IVRI), Izatnagar
- Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri
- National Dairy Research Institute (NDRI), Karnal
- Tamilnadu Veterinary and Animal Sciences University (TanuVAS), Chennai
- University of Agricultural Sciences (UAS), Bengaluru

## 7.5 Human Resource Development

Training of library professionals and other staff associated with the project includes:

- Digital library software and OAI-PMH
- Library automation and WorldCat
- Digital library content management standards
- Capacity building of librarians and other professionals on library management with reference to union catalogue
- Creation, organisation, and management of online digital libraries and institutional repositories
- Use of Web 2.0 technologies
- User interaction and web-security
- Online search services
- Organising annual conference cum workshops, etc.

## 7.6 Deliverables/outcomes

- (a) Catalogues of selected libraries is being converted into union catalogue and is now part of WorldCat under the group name 'Indian Agricultural Research Group Catalogues'
- (b) Major selected libraries becoming e-Granth or digital libraries with the digitisation of most of the institutional resources
- (c) Most of the librarians under NARS have acquired modern knowledge such as library and information management, union catalogue, Z39.50 server and client, OCLC membership, web 2.0 and library 2.0 technologies, digital library and digital preservation, e-publishing, etc. Some of the professionals got advanced training with OCLC, NAL, etc.
- (d) The first annual conference of librarians and informaticians of NARS in the lines of CALIBER/ NACLIN was organised during 24-25 February 2011
- (e) The libraries and infolibrarians would be ready to migrate to modern management paradigms with web 2.0 and library 2.0 technologies
- (f) Partner libraries would become at par with world libraries with respect to library and information management, rich with digital resources and web contents
- (g) Institutional digital repositories
- (h) Trained librarians in maintenance of digital library
- (i) Union catalogues–serials, monographs, dissertations, etc.
- (j) Website with content management system
- (k) Open access service provider, etc.

## 8. CONCLUSIONS

For the projects and web-based agricultural information systems and services for the NARS users, libraries and librarians have so far been very successful, starting with NATP model. The missions and objectives of the NATP, NAIP, *KrishiPrabha*, CeRA and e-Granth are being achieved specially as far as libraries, librarians, web-based systems and services under NARS are concerned. The outcomes have started coming from all the point of views of the projects and it is expected that currently running project components, i.e., *KrishiPrabha*, CeRA and e-Granth will achieve their goals and new heights as per their mandates in the time to come.

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## About the Author

**Dr Nabi Hasan** is presently working as Deputy Librarian in Indian Institute of Technology Delhi. He has published two books, compiled two bibliographies and has over 55 publications. He is member of Editorial Boards of four international and national journals of Library and Information Science. He was the first Borlaug Fellow from developing countries in Library Information System at Cornell University, New York, USA in 2006. He is the recipient of the *Vice-Chancellor Appreciation Award 2003* for the Exemplary Work and Conduct. His library received *Best Library of the Year Award 2010* at the World Management Congress, New Delhi. He has implemented three ICAR/World Bank funded projects on library automation, digitisation and institutional repositories and has also implemented ISO 9001-2008 standard in the library. His area of interest includes: e-books, scientometrics, institutional repositories, digitisation, RFID, and e-resources consortia.