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Digital Agricultural Knowledge Platform (IDEAL) using KOHA for National Agricultural Research and Education System

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ABSTRACT

Digital libraries are equipped to provide access to multiple contents with potentially infinite number of resources to users. The libraries of the Indian National Agricultural Research and Education System (NARES) mainly the ICAR institutions and Agricultural Universities have a collection of huge literature of immense value available in various print and digital forms. These resources if made available at a single platform will go a long way in facilitating its sharing and minimizing the duplication efforts by the partner libraries. Realizing its importance, a requirement of a national level union catalog was felt to ensure single point access for the valuable information on the vast resources of NARES libraries. Information and Communication Technology (ICT) brought solution to a lot of challenging issues to all facets of the university system and the library is not an exemption. The Indian Digital Ensemble of Agricultural Libraries (IDEAL) is a customized platform for Agricultural Libraries of Indian National Agricultural Research and Education System (NARES) by adopting the KOHA-an open source integrated library management software for their routine operations in all libraries. KOHA is a software platform built on 'Software as a Service' (SaaS) concept to provide hassle free, ready to use based platform for sharing library holdings through a union catalogue as per the international standards. In this catalogue, the information can be shared at a single platform for all the users for example, students, researchers and faculties, extension workers and others. The system also provides search facilities through various parameters example, title, author, subject, number etc. The libraries of the State Agriculture Universities and its constituent colleges (SAUs) and ICAR institutes have been connected at a central server for its routine activities through IDEAL Platform. An online public access catalog (OPAC) of each library has been created, which provides easy and enhanced experience of accessing the library resources 24 × 7 to the users. This has greatly facilitated sharing and access of library resources among the NARES partners.

Keywords: IDEAL, Koha, Library management software, Open source software, Union catalogue

Digital libraries are becoming the norm at the academic institutions as they combine technology and information resources to allow remote access to educational content while breaking down the physical barriers. A digital collection is an online database of digital objects that can include text, still images, audio, video, digital documents or other digital media formats or a library accessible through the internet. These libraries are equipped to provide access to multiple contents with a potentially infinite number of resources to users. The traditional libraries have sometimes a limitation of physical space. Thanks to Internet and cloud storage, digital libraries have overcome this limitation, expanding the horizons in learning. The library users can access an enormous amount of knowledge and share contents with others, facilitating the expansion of education and research. The fast rate at which technology is improving, a large number of readers also prefer the soft copies or digital version of their books since it is easily accessible through their mobile device and there is no time constraint as the resources are available 24 × 7 without having to worry about the opening or closing hours of the library.

The pursuit for excellence in all aspects of educational system made it imperative for universities around the world to rise up to their responsibilities. Information and Communication Technology (ICT) has transformed the world and in all fields including the educational institutions and library is not an exemption. In an information era ICT plays an important role to provide information to their users. The main objective of the library is to provide right information to the right users at a right time where library automation plays an important role for transforming library services globally (Yeo 2008). Libraries play a vital role in storing and providing large amount of different collection of material that includes historic and recent. Manually, it's

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difficult to maintain this large amount of bibliography data as searching and retrieving required information from this data would be very difficult and time consuming for the librarians. Every user wants to retrieve required information in no time and manually it's difficult to respond to multiple users' queries instantly from bulk of data available in the library. Automation of library is therefore required to ease and fasten the library functions not only for the librarians but for the end users also. With the library automation, librarians can do the cataloguing, circulation, maintaining patron data, reports etc. that organize the data and users don't have to wait much for the response to his queries any longer. Automated library provides storing, searching and retrieving not only library collection but also the user information and past circulation data. Various reports can also be generated for through automated library system for the annual review purpose. Automation of libraries provides smooth and sorted structure to libraries.

Open Source Software (OSS) is gaining popularity especially in the library profession and emerged as an alternative model of and revolutionized the software development. Library automation has helped to provide easy access to collections through the use of computerized library catalogue such as On-line Public Access Catalog (OPAC). In the last decade, several attempts were made to develop software for libraries on open source platform and as a result, many open source library automation software, open source digital library software and other useful OSS for libraries drawing the attention of librarians but KOHA is most preferable option is found (Hylén 2006). Koha Library Software is the free and opens source library system. It is a fully featured, scalable library management system developed by libraries of varying types and sizes, volunteers, and support companies worldwide. Koha is the first of its kind, an open-source Integrated Library Software (ILS) used worldwide by all kind of libraries for library management as well as day to day activity of library. The name of the ILS become Koha from a term called Mãori which means a "gift" or "donation". The ILS is developed at a modern platform and is a web-based solution for the libraries. Koha software was originally build up and developed in New Zealand by the company called as Katipo Communications Limited. The Integrated Library Software Solution was first deployed in the year January, 2000 for Horowhenua Library Trust. Since then, with the successful installation and implementation, the software solution has become popular and has been adopted by thousands of libraries worldwide in number, adding and contributing to the features and functions, thus deepening the capability, potential and competence of the software (Uzomba *et al*. 2015).The objective of IDEAL is to integrate libraries of SAU's and ICAR institutes on single centralized platform with decentralized management.

The Indian Council of Agricultural Research (ICAR) has initiated several digital initiatives for transformation of the agricultural research and education system. The Consortium of e-Resources in Agriculture (CeRA), RKMP (Rice Knowledge Management Portal, Agroweb, Agripedia, Krishikosh, etc. were the major platforms to access the information. To bring all such resources at one platform, the E-Granth project was initiated to enable digital access to vast amount of information available in the NARES, which is one of the largest agricultural research and education system in world. To provide a digital solution which can give access to multiple contents with a potentially infinite number of resources the IDEAL platform was launched at the AKMU, ICAR-IARI, New Delhi. The plateform has been developed with the objective of building a virtual heritage for the future generation; help the scientific community to store the reservoir of important research data, information and findings. The platform provides instant access to a wide range of educational contents and also preserves the valuable documents against deterioration with quicker and easier information retrieval.

Architecture of IDEAL Platform

IDEAL, an integrated automated library system delivered at the desk of researchers, faculty and students of NARES can definitely boost the quality of research output and save time. For library users all over NARES, an OPAC page of their own library provides easy and enhanced experience of using library online. Even while on move they can access their library using smart phone. Integrated catalog of whole NARES (AgriCat) provides access to holdings of other libraries of NARES. A robust set of servers along with failover servers operational at the data center of Indian Agricultural Research Institute (IARI), Pusa, New Delhi provide hosting facilities for customized Koha open source software running independent instances for each library (Jain *et al*. 2016, Amrendra *et al.* 2022). It is a centralized library system managed on decentralized basis. IDEAL Platform integrates SAU's library, ICAR institute library and Agriculture deemed university library with their affiliated college library on central server. In Fig 1 flow chart presented structured connection of decentralized library with centralized server. Union catalogue is highest level in the hierarchy it includes all SAU's, central Agricultural University, ICAR institute library on OPAC page i.e. IDEAL. IDEAL is Integrated Library Management System which include all library portal on single platform with search facility of books by title, author, subject, call number, series. IDEAL includes advance search option which gives specific results. Union catalogue have facility of staff login for managing library portal individually by universities and it makes library instances for all libraries stored in centralized server (Indian Agricultural Research Institute, New Delhi server). Local mirror servers at individual libraries in sync with their Koha instance at central server ensure redundancy and high availability. However, those who are not running their local server may run offline Koha module on any desktop to ensure uninterrupted circulation services in the event of connectivity failure. All circulation data can be easily uploaded to central server for maintaining full record as soon as connectivity is restored.

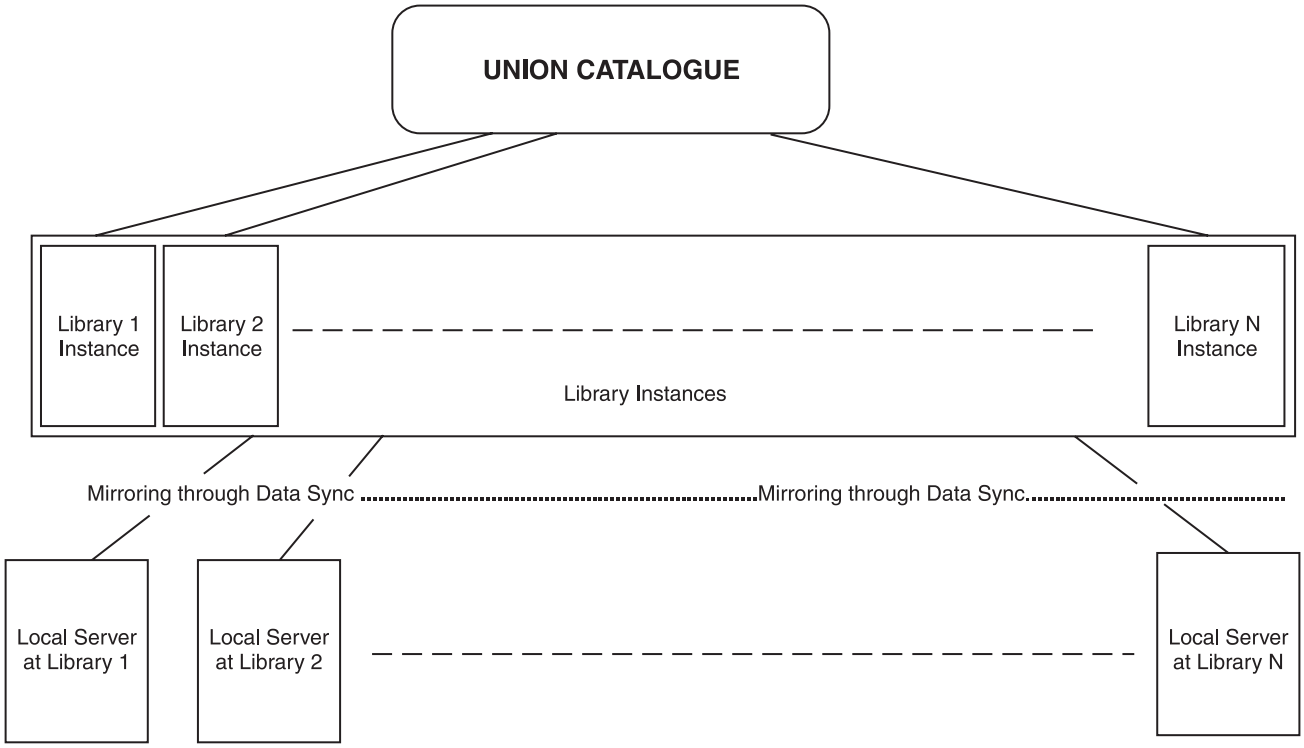

Fig 1 Logical structure of IDEAL- Union catalogue.

Koha Architecture

Koha application follows client-server model, which works on the distributed structure for partition of workload between the providers and end users. The recommended operating system for Koha is Debian Linux, however it can be implemented on any Operating System, viz. Linux, Unix, MAC, windows etc. At client's level a web browser/ graphical browser required to access the system. Koha has a three-layer architecture which divides the software into three different layers (Fig 2), viz. (i) Database Layer deals for the access to the database management system (ii) Processing Layer deals with the processes and procedures required by the user and (iii) Formatting Layer provides templates for the appearance and presentation in HTML format. The cascading style sheets (CSS) are used for customizing the interface of Koha software. Through OPAC page customization can be initiated.

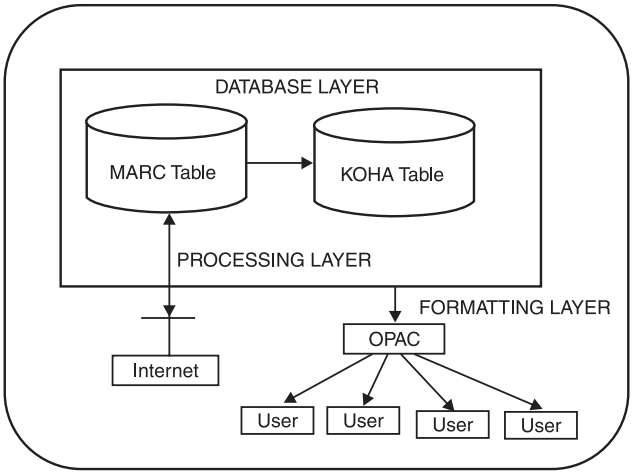

Fig 2 KOHA Architecture.

Implementation of KOHA software for development of IDEAL Platform

Koha Software Requirements: For server operating system in Koha, Linux, Open Berkeley Software Distribution (BSD), Mac-OS, or any other Unix version are required. Apache is used as web server while programming language used is Perl/PHP and for a database MySQL is used in the Koha platform. Stable version of Integrated Library software package can be taken from (http://www.koha-community.org/).

Koha Graphical User Interface (GUI): Koha GUI has two parts namely Staff client and OPAC page. Staff client interface is for the librarians for executing all the library operations like circulation, patron related operations, cataloguing etc. Koha Staff Client has various modules to completely automate the library operation. These modules can be distributed to library staff accordingly to divide the library services (Reddy *et al*. 2013).

The list of Koha Module includes:

- Acquisitions: Koha has an acquisitions module with complete functionality of recommendation, ordering, receiving, invoicing, budgeting, book funding, setting suppliers and exchange rates.
- Circulation: a complete featured and powerful circulation module with customized circulation rules to suit any kind of library; it fully automates the borrowing and item management.

- OPAC: Koha has all the elements and attributes of OPAC with a simple and clear interface, and in addition to it also supports content from sources of collections like Amazon, Google Books, etc.
- Flexible reporting: Koha provides access to the RDBMS, so reports can be easily customized and prepared as per the individual requirements.
- Customizable item types: The catalogue items can be opted as per the preference and requirements of the individual libraries.
- Barcode/RFID: The ILS Koha is based on the web browser and it is fully compatible with all kinds of bar-code, QR codes, RFIDs and other similar technologies.
- User management: The software provides incorporation with systems like LDAP, Active Directory, Radius and SAML to allow single sign-on facility for the user's management.
- Metadata: Koha has a potential to generate a qualitative metadata, it uses a full text indexing engine to allow for speedy and authoritative searching of metadata.
- Standards: Koha uses all latest standards including MARC21, UNIMARC, Z39.50, SRU/SW, SIP2 and many more are supported.
- Automated overdue notices: Overdue notices are either provided by email or SMS.
- Consortia mode: The ILS can work as multi-branch or single-branch mode in the consortia mode.
- Translations: Koha is translated into many languages and is available in nearly 62 languages.
- Offline circulation: Koha also provides provision to do offline circulations.
- Self-Check: Koha also facilitates the use with SIP2 compliant self-check-in, check-out machines.
- Faceted searching: Koha provides the federated search results which are classified for its users.
- Web-based solution: The ILS is completely web based from the functionality like OPAC, staff, administrative features. The self-check-out, check-in interfaces are based on standards compliant with the latest WWW technologies like XHTML, Cascading Style Sheets and Javascript. It is because of these reasons the LibLime Koha is completely known as a Web-based solution.
- Parent-child relationship: It provides parent child re-lations for patron records and copy patron feature to promptly and rapidly add families.
- Batch mode: Provides the facility to import and export batches from the catalog through a single file upload.

For the end users Koha provides a OPAC that itself is complete interface to assist user. In OPAC page search of resources for respective library can be made using fields like Keyword, Subject, Title, Class, Barcode, author, publisher, etc. Member patron can place hold, reserve, make list of preferred library resources etc. With the help of Bibilio basket logged-in members can select records from an OPAC search and retrieve them by e-mail. OPAC users can also submit suggestions for acquisition. Koha automatically informs the OPAC user (by e-mail) of the action taken on each suggestion.

Development of IDEAL Platform

For integration of all library resources available at various libraries of SAUs and ICAR Institutes a unified catalog has been created and hosted at ICAR-IARI, New Delhi integrated with implementation of day-to-day library operation software 'Koha'. Through which 24x7 online access can be provided to all library resources of NARES to all students, faculty, researchers and all other stake holders in agricultural research and education. This can go long way in enhancing the educational standards of our university and quality of agricultural research. Registration of library for creation of instance, migration of data and day to day activity of library management centralized platform for connecting all NARES library with decentralized management has been created. This platform is named as Indian Digital Ensemble of Agricultural Libraries (IDEAL) platform and developed on software as a services (SaaS) architecture with independently configured instance for each library having OPAC and staff client running on centralized server along with option to run local mirror to individual library. It can be accessed at http://ideal.egranth.ac.in. The front page of the IDEAL platform is presented in Supplementary Fig 1.

Technical implementation of IDEAL

The Debian packages are the preferred, and easiest, way to install Koha. So, the Debian is chosen over wide range of available Operating Systems. Debian current version 9.x (Stretch) was successfully installed on any server with required configuration. Setting mirrors for downloading required packages is set in a Debian file.

This is followed by setting path of for current stable version of Koha. Adding the key in gpg.asc to APT trusted keys to avoid warning messages on installation. Through apt-get update repository is updated to reflect the changes made in the system.

Through apt-get update repository is updated to reflect the changes made in the system. Koha installation is then started, by running the simple "install koha-common" command. Koha installation is a little long process, after completion of which server configuration is done.

In server configuration ports are set in Koha configuration files for OPAC and Koha-client. Apache2 ports file also updated to listen the mentioned ports.

Apache is then restarted to save and reflect the changes so made and modules and sites are enabled by commands (sudo a2dissite 000-default0, sudo a2enmod deflate, sudo a2ensite library).

In Koha, MySQL is used as a database, the MySQL can be installed after this , if not available earlier. Koha instance is then created, that creates a database in the MySQL database with same name as that of the instance e.g. If the instance created is 'library1' then database is created by the name 'koha_library1'. After that if this is the

fresh installation then the web-installer steps are followed through browser.

Multiple instances can also be created in Koha to maintain different libraries. Multiple instances mean different libraries with entirely different collections, policies, preferences, etc. This results in completely independent instances, where each instance has its own database, with bibliographic records, patrons, setting etc. completely independent from all the other instances. For this, new ports for OPAC and staff client, are added in the apache2 server ports file. After that, through "koha-create --create-db." command new instance library is created. That creates a database with the same name as that of the instance. After creating the instance, ports are added in the instance configuration file under OPAC and Staff Client (Breeding 2014) (Supplementary Fig 2).

Koha instance list can be checked using 'koha-list' command (Supplementary Fig 3), with each instance a configuration file is created where ports can be changed for new instance OPAC and Staff client. For fresh installation web-installer is followed to build the library instance OPAC and Staff-client, with the local host followed by respective port number for staff client, mentioned in the instance configuration file. If the data backup is already available for a new instance that can directly be restored in the instance created, then it is restored in the database of created instance. "koha-upgrade-schema" command is run to upgrade the schema to current version. After upgradation of the database schema, zebra command is run to reflect the current indexes.

Union catalogue

To integrate all library resources available at various libraries of SAUs and ICAR Institutes, a unified library instance for State Agricultural Universities/ Deemed Universities/Central Agricultural Universities (SAUs/ DUs/CAUs) Integrated Digital Ensemble of Agricultural Libraries-an IDEAL platform were developed and hosted at ICAR-IARI integrated with implementation of day-to-day library operation software 'Koha' (http://ideal.egranth.ac.in/). Besides this library of few ICAR institute were also integrated (Table 1).

Features of IDEAL Platform through KOHA software

Computers and advanced technologies have made it possible to enhance services in diverse industries including libraries. Through library automation, in-house collections and resources can be computerized, spreadsheets and databases can be automated, CD-ROMs can be provided in-house and the Internet can be made available to patrons. Various factors must be considered when planning library automation include how automation will help the library and educate the public, how automation fits into the library's technology plan and how it fits into the budge (Sani *et al*. 2005).

- Improved customer service: Library automation reduces the workload for library staff in terms of cataloging, circulation and acquisitions. This frees up time to provide a higher quality of service to library patrons. The staff becomes available to answer reference questions, help people with research work and find information on request. With automation, finding library materials such as books and reference journals becomes easier and less time consuming. Patrons no longer have to wait ages for a harried library staff member to attend to requests.
- Proven, stable technologies: Koha is tried and tested and has demonstrated both stability and scalability, used in hundreds of libraries worldwide.
- Software collaboration and resource sharing: Software solutions that are freely available to all libraries worldwide, libraries benefit from the contributions of other participating library systems.
- Long term support: With proprietary software, source code is 'closed' and support and future development of

Table 1 Libraries under NARES with total number of titles and volumes

State	University/ College/ Institute Name	Total Titles	Total Volumes
Andhra Pradesh	Acharya N G Ranga Agricultural University, Guntur	43411	60016
	Sri Venkateswara Veterinary University - N.T.R. College of Veterinary Science, Gannavaram	3034	9954
	Sri Venkateswara Veterinary University, College of Fishery Science, Muthukur	2966	4303
	Sri Venkateswara Veterinary University, College of Veterinary Science, Proddatur	1032	3747
	Sri Venkateswara Veterinary University, Tirupati	3887	8244
Assam	Assam Agricultural University, Jorhat	44086	58900
Bihar	Bihar Agricultural University,Sabour	12533	19408
	Dr. Rajendra Prasad Central Agriculture University, Pusa	24030	28107
Chhattisgarh	Indira Gandhi Krishi Vishwavidyalaya, Raipur	21707	43698
Gujarat	Anand Agricultural University, Anand	49546	80953
	Anand Agricultural University, College of Agricultural Engineering & Technology, Godhra	693	3658
	Anand Agricultural University, College of Agriculture, Vaso	907	914

Contd.

Table 1 (*Continued*)

State	University/ College/ Institute Name	Total Titles	Total Volumes
	Junagadh Agricultural University, Junagadh	41334	64817
	Kamdhenu University, College of Dairy Science, Amreli	1261	1347
	Kamdhenu University, Gandhinagar	471	686
	Navsari Agricultural University, Navsari	59601	63296
Haryana	ChaudharyCharan Singh Haryana Agricultural University, Hisar	154512	246106
	Lala Lajpat Rai University of Veterinary & Animal Sciences, Hisar	1811	1852
Himachal Pradesh	ChaudharySarwan Kumar Himachal Pradesh KrishiVishvavidyalaya, Palampur	3875	3980
	Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan	36261	47224
Jharkhand	Birsa Agricultural University, Ranchi	11302	14407
Karnataka	Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar	6319	13449
	University of Agricultural Sciences, Bengaluru	120980	156627
	University of Agricultural Sciences, Dharwad	56960	88089
Kerala	Kerala Agricultural University - KelappajiCollege of Agricultural Engineering & Technology, Tavanur	13669	19657
	Kerala Agricultural University - Thrissur	28176	36325
	Kerala Agricultural University, College of Agriculture, Padannakad	2388	5055
	Kerala Agricultural University, College of Agriculture, Vellayani	19765	22926
	Kerala Agricultural University, College of Co-Operation, Banking & Management, Thrissur	10048	11433
	Kerala Agricultural University, College of Forestry, Vellanikkara	5753	5880
	Kerala Agricultural University, College of Horticulture, Vellanikkara	18375	22480
	Kerala University of Fisheries and Ocean Studies, Kochi	17022	18653
Madhya Pradesh	Jawaharlal Nehru KrishiVishwaVidyalaya, Jabalpur	40008	79262
	Nanaji Deshmukh Veterinary Science University, Jabalpur	8168	8206
	Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior	8364	8664
Maharashtra	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli	5710	7554
	Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola	144374	202386
	Maharashtra Animal and Fishery Sciences University, College of Fishery Science, Udgir	1464	3863
	Maharashtra Animal and Fishery Sciences University, College of Veterinary and Animal Sciences, Udgir	131	369
	Maharashtra Animal and Fishery Sciences University, College of Veterinary and Animal Sciences, Parbhani	1971	5519
	Maharashtra Animal and Fishery Sciences University, Krantisinh Nana Patil College of Veterinary Science, Satara	1588	3256
	Maharashtra Animal and Fishery Sciences University, Nagpur	15998	25039
	Maharashtra Animal and Fishery Sciences University, Post Graduate Institute of Veterinary And Animal Sciences, Akola	1668	1925
	Maharashtra Animal and Fishery Sciences University–College of Dairy Technology, Latur	1088	3667
	Mahatma Phule Krishi Vidyapeeth College of Agriculture Nandurbar	440	469
	Mahatma Phule Krishi Vidyapeeth, College of Agriculture, Karad	411	441
	Mahatma Phule Krishi Vidyapeeth, College of Agriculture, Pune	34870	56779
	Mahatma Phule Krishi Vidyapeeth, Rahuri	72442	77434
	Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, 431402	49212	74862
Nagaland	Central University, Medziphema	25099	27262
Odisha	Orissa University of Agriculture and Technology, Bhubaneswar	21459	28167
Punjab	Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana	13794	21604
	Punjab Agricultural University, Ludhiana	151060	296613

Contd.

Table 1 (*Concluded*)

State	University/ College/ Institute Name	Total Titles	Total Volumes
Rajasthan	Agriculture University, Kota	4446	10689
	Rajasthan University of Veterinary and Animal Sciences, Bikaner	13725	39555
	Sri Karan Narendra Agriculture University, Jobner	49903	49903
	Swami Keshwanand Rajasthan Agricultural University, Bikaner	11901	16115
Tamil Nadu	Tamil Nadu Agricultural University, Coimbatore	83732	106383
	Tamil Nadu Veterinary and Animal Sciences University, Chennai	2250	5757
	Tamil Nadu Veterinary and Animal Sciences University, College of Poultry Production And Management, Hosur	5	8
	Tamil Nadu Veterinary and Animal Sciences University, College of Food And Dairy Technology, Koduvalli	1279	1288
	Tamil Nadu Veterinary and Animal Sciences University-Madras Veterinary College, Chennai	45272	52024
	Tamil Nadu Veterinary and Animal Sciences University-VCRI, Tirunelveli	854	854
	Tamil Nadu Veterinary and Animal Sciences University-Veterinary College And Research Institute,Namakkal	3760	4375
Telangana	Professor Jayashankar Telangana State Agricultural University, Hyderabad	43657	60231
	PV Narsimha Rao Telangana Veterinary University, RajendraNagar, Hyderabad	5036	8659
Uttar Pradesh	Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad	38127	51034
Uttarakhand	G. B. Pant University of Agriculture and Technology, Pantnagar	150736	269931
West Bengal	Bidhan Chandra KrishiViswavidyalaya, Mohanpur	23140	23140
	Uttar Banga Krishi Vishwavidyalaya, Cooch Behar	21998	34928
ICAR Institutes			
Bihar	ICAR Research Complex For Eastern Region, Patna	2613	2943
	ICAR- National Research Centre on Litchi, Muzaffarpur	1306	1675
Delhi	ICAR- Indian Agricultural Research Institute - Division of Agricultural Physics, Pusa, New Delhi	1062	1100
	ICAR- Indian Agricultural Research Institute, Pusa, New Delhi	138514	294086
	ICAR- Indian Agricultural Statistics Research Institute, Pusa, New Delhi	32778	37701
Haryana	ICAR- Central Soil Salinity Research Institute, Karnal	12243	21830
	ICAR- National Dairy Research Institute, Karnal	48176	94620
Himachal Pradesh	ICAR- Central Potato Research Institute,Shimla	39627	40791
Karnataka	ICAR- Central Plantation Crops Research Institute, Regional Station-Vittal	5241	10546
Kerala	ICAR- Central Institute of Fisheries Technology, Cochin	10917	18678
Kerala	ICAR- Central Plantation Crops Research Institute, Kasaragod	10015	22823
	ICAR- Central Plantation Crops Research Institute, Regional Station-Kayangulam	2786	8168
	ICAR- Indian Institute of Spices Research, Kozhikode	5727	5852
Maharashtra	ICAR- National Bureau of Soil Survey and Land Use Planning, Nagpur	5996	10517
Odisha	ICAR- Central Institute of Freshwater Aquaculture, Bhubaneswar	5711	9889
Rajasthan	ICAR-Central Arid Zone Research Institute, Jodhpur	17865	19468
Tamil Nadu	ICAR- Central Institute of Brackishwater Aquaculture, Chennai	6127	15022
Telangana	ICAR- Directorate of Poultry Research, Rajendranagar, Hyderabad	1383	2459
	ICAR- National Academy of Agricultural Research Management, Hyderabad	26931	37715
	ICAR- Indian Institute of Oilseeds Research, Rajendranagar Hyderabad	4766	6899
Uttar Pradesh	ICAR- Indian Veterinary Research Institute, Izatnagar	32332	118041
West Bengal	ICAR- Central Inland Fisheries Research Institute, Barrackpore	5283	6578
	ICAR- National Institute of Research on Jute and Allied Fibre Technology, Kolkata	4763	6797

the product rely on the success and resources of a single vendor. Open-source solutions rely on stable code bases developed and supported by many providers worldwide.

- Cataloging benefits: With the help of library automation, automated cataloging standards, for example, machine readable cataloging (MARC) help librarians to catalog items quickly. It is possible to catalog items for easy reference using vendor-supplied catalogs. Professional cataloging with the use of scanning technology can be employed where bar codes on books can be scanned directly into the catalog database. Automated cataloging makes the task of keeping track of library materials that much easier. It also helps to quickly identify inventory stock when budgeting for new library materials.
- Free/open source software koha is an economical alternative to reliance upon commercially supplied software. It means the cost involved development, license, upgrading, maintenance etc., lower than commercial software. koha does not need the initial cost like commercial software. Free/Open source Koha has all the feature of commercial software.
- Cost-effective: paying licensing fees for proprietary solutions, users of open-source software can often deploy the product using in-house resources. They pay only for needed support or any additional vendor services they require.
- Employee retrenchment: There are many benefits to library automation, but one of the major disadvantages is employee cutbacks. With a huge amount of the budget being spent on automation, there is generally not much funding left over for salaries and employee benefits. Further, the need for the full complement of library staff is not there anymore. Automation takes over many of the functions that people perform. For example, patrons can check out their own books by swiping the library card and then scanning the book's bar code in a special scanning machine. Patrons no longer need people to help them locate library materials, the computers provide the information.

Conclusion

The Indian Council of Agricultural Research (ICAR) has been initiating several activities to effectively use the recent information and communication technology (ICT) in the field of library. Indian Digital Ensemble of Agricultural Libraries (IDEAL) is an online platform for Agricultural Libraries of the National Agricultural Research and Education System (NARES). It has integrated a huge number of libraries from the agricultural universities, its constituent colleges, ICAR institutes on a single platform for their regular activities. KOHA software has been used for implementation of Integrated Library Management System**.** Both IDEAL and KOHA have excellent functionalities in the essential modules for a library management system (LMS). However, IDEAL runs on Linux server and stores database of all libraries at the Agricultural Knowledge Management Unit (AKMU), ICAR, Indian Agricultural Research Institute, New Delhi and is accessed by OPAC webpage by all integrated institute. IDEAL is a centralized managed platform because of this it reduces cost of hardware and makes it more users friendly. It also provides 24x7 online accesses to all library resources of NARES to all students, faculty, researchers and all other stake holders in agricultural research, education and extension. Having more than 23 lakh titles and over 36 lakh volumes of the vast and valuable resources it has been of immense value to the stakeholders. It's a single window catering to the majority of the requirement of the researchers, students, faculties and other stakeholders. The search facilities through Library catalog, Title, Author, Subject, ISBN, Series and Number etc. and has greatly facilitated in the usage by all. The new libraries may be able to register themselves for centralized availability of their resources. As open source software koha is used which is an economical alternative to reliance upon commercially supplied software, therefore its sustainability increases and is beneficial to a large number of users. The cost involved development, license, upgrading, maintenance etc., are lower than commercial software. Free/Open source Koha has all the feature of commercial software. It is also time tested and has demonstrated both stability and scalability and used in hundreds of libraries worldwide. Library automation also increases the efficiency by reducing the workload of the library staff in terms of cataloging, circulation and acquisitions. This frees up time to provide a higher quality of service to library patrons. It is planned to bring the entire library resources of the Indian National Agricultural Research and Education System (NARES) at one place, thereby, making it a unique repository for literature related to agriculture and allied sector.

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