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Usage of E-Resources of Libraries Agricultural Institutions in India

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ABSTRACT

This study presents an overview on usage of e-resources of agricultural university libraries in Rajasthan, India. A crucial national resource is thought to be information. Agriculture has a significant role in the development of the economy. A rise in farm production as a result of agricultural technological advancement boosted the farmer's income and well-being. The major goal of agricultural research is to increase the yields from increasingly dispersed landholdings in a healthy and sustainable way. A growing population necessitates more agricultural output to meet their needs. A requirement for encouraging farming and raising agricultural output is agricultural research.

Keywords: E-resources; agricultural research; information systems; agricultural universities.

1. INTRODUCTION

Agricultural information systems and agricultural research in India: The growth and advancement of the economy depend heavily on agriculture. It is an important source of food. It offers crucial raw resources for domestic or foreign industries. Agriculture has been essential to the growth of human civilization. Agricultural research is crucial in this situation for increasing

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agricultural output. Because of the ongoing availability of more advanced production technologies, productivity is raised [1].

To guarantee the safety of people's food and nourishment, agricultural research is required. To make a wide range of agricultural products, including grains, legumes, more must be produced. To increase the output, excellence, success, appropriateness, besides of main agricultural structures, research should be improved. The major goal of agricultural research is to increase the yields from increasingly dispersed landholdings in a healthy and sustainable way. The field of food processing and preservation offers enormous and significant research potential.

In order to advance global agricultural research, the Consultative Group on International Agricultural Research (CGIAR) was founded in the 1970s [2].

NARS - India: The most important industry for India's economic and physical development has been agriculture. Agriculture and related industries generate roughly 14.4 % nation's GDP [3].

The expansion of agriculture is essential for the nation's political and economic development. An rise in farm production as a result of agricultural technological advancement boosted the farmer's income and well-being. India has freed itself from pleading boucle’s grip polite need on industrialized nations aimed at these woman fundamental requirements to become self-reliant. The strengths of agricultural research in India have been judicially outlined by Arunachalam and Umarani [4]. A little over 17% (1998 CAB Abstract) of agricultural research is conducted by ICAR institutes, which is slightly more than the 15.2% average over the five years from 1990 to 1994. 11,855 publications from India have been indexed by CAB Abstracts among them are 10,412 journal papers from over 1280 organizations across 531 places popular 21 main study categories and 243. Out of these 10,412 journal papers, 208 Indian publications published 78% of them, and 22% of them appeared in international journals. Only 33 publications with an impact factor greater than 3.0% were published. It demonstrates India's extensive domestic agriculture research capacity.

India has built up the necessary research infrastructure and scientific talent to create the necessary technologies, and as a result of these technological advancements, the country has made significant progress in agricultural productivity.

In a certain nation, NARS is described as "comprising all public and private institutions devoting full time or part time to agricultural research and committed to a national research agenda." These institutions can be categorized broadly into the following groups:

“Organizations, like the National Agricultural Research Institute (NARI), whose sole purpose is to conduct research.

- The faculties of agriculture and allied fields, as well as the endowments of social sciences and economics in universities, are higher education institutions that focus on teaching and research.
- Some ministries' technical divisions and development organizations that use approximately adaptive investigate agendas.
- “NGOs and the private sector.

Because they have never been committed to a national research agenda, the international agricultural research centers (IARCs) of the CGIAR (Consultative Group on International Agricultural Research) are not a member of NARS. Their attention is on a regional and global scale [5].

India has put in place a sophisticated and successful system for agricultural research. One of the biggest agricultural systems in the world is the NARS in India. The fast expansion of agriculture has been considerably aided by the system's efficient operation. After years of practice and research experimentation, India's current agricultural research system was created.

2. CHRONOLOGICAL CONTEXT

Around the world, there was interest in agricultural science around the turn of the 20th century. During the British era, the Lord Curzon government in India also took the initiative to draft a policy for agricultural research and advancement. In order to bring about the needed change in agricultural methods, it was realized that the construction of agricultural research institutes, experimental farms, and agricultural colleges would be necessary. Imperial (now

Indian) Agricultural Research Institute was founded in 1929 at Pusa, Bihar**.**After the catastrophic earthquake of 1935, it was later moved to New Delhi in 1936. Since its founding, it has been envisioned that this Institute will serve as the national center for agricultural research, with branches expanding throughout the states. Six agricultural colleges were constructed as part of an additional policy action plan in Pune, Kanpur, Nagpur, Lyallpur, Coimbatore, and Sabour. A Central Legislative act established the Imperial (now Indian) Council of Agricultural Research as a statutory organization in 1929. Leading institution ICAR directs, funds, and coordinates research on issues related to agriculture and animal husbandry. Its scope encompasses not only research projects but also agricultural education and extension, the teaching of agricultural and animal husbandry statistics to students, and the dissemination of research findings.

After India's independence, the National Agricultural Research System (NARS) has made great progress toward becoming a successful system. The system has expanded into one of the largest agricultural research systems in the world from a few central institutes, regional centers, commodities committees, and agricultural colleges. In order to help, coordinate, and promote research and education at the national level, ICAR was established as the supreme body. The national government and some export commodities cess fund it. State agricultural universities (SAUs) were first established as an important part of NARS in the 1960s [6].

3. NARS COMPONENTS

The following categories can be used to the parts of the Indian Agricultural Research System (NARS- INDIA) [7]. –

- ICAR System
- The System of Agricultural Universities
- General Universities have strong Departments or Faculties in a range of agricultural and related topics;
- Scientific Institutions engaged in agriculture-related research
- Governmental Agencies in the Center
- Private Institutions/Voluntary Organizations engaged in Agricultural Research

ICAR system: The Indian Council of Agricultural Research (ICAR) is the top organization in India that supports, promotes, and organizes agricultural research and education initiatives across the board. Through its own institutions, it also conducts research, primarily on issues of national significance. The honest efforts of ICAR have played a significant role in India's transformation from a nation with a food deficit to one with a food surplus. The vast network of the ICAR consists of numerous research projects, bureaus, national research centers, and project directorates, as well as institutes. 4 deemed universities, 45 research institutes, 6 national research bureaus, 17 national research centers, 25 directorates/project directorates, 61 All-India coordinated research projects, and 630 krishivigyankendras [8] are some of the organizations that the ICAR uses to carry out its duties.10 With the curricula and other normative guidance provided to the 47 agricultural colleges, the ICAR also carries out agricultural education.

A two-year Post-Graduate Course leading to the Diploma of Associate ship of IARI (Associate IARI) in the fields of Agricultural Bacteriology, Agricultural Botany, Agricultural Chemistry, Agronomy, Entomology, Horticulture, Mycology, and Sugarcane Breeding was the first step in the IARI's introduction of agriculture education in 1923.

- The Ministry of Education approved the Diploma Programme as being comparable to the M.SC. degree offered by Indian Universities in 1949.
- Under the UGC Act of 1956, the Institute was given the status of a Deemed to Be University in 1958, and the M.Sc. and Ph.D. degrees took the place of the diploma.
- In 1951, Central College of Agriculture and IARI amalgamated.
- IARI collaborated closely with ICAR while being directly administratively controlled by the Ministry of Food and Agriculture until 1951.
- IARI may have been the first college in the nation to implement the course credit system of education, which was inspired by the Land Grant College of the USA.
- IARI currently offers M.Sc. and Ph.D. degrees in 26 subjects on its main campus, as well as M.Sc. degrees in a few other areas at its campuses in Assam and Jharkhand. The institution also provides Ph.D. programs in a few subjects at the CIAE in Bhopal and the IIHR in Bengaluru.

- Beginning with the academic year 2020–21, NIASM Baramati, NIBSM, Raipur, and IIAB Ranchi will offer M.Sc. programs in a few different fields.

In 1958, IARI was designated as a "Deemed-to-be University," Up to 1957, 903 students received Associate ships from IARI, which were accepted as being equal to M.Sc. degrees from Indian universities. Up until February 2021, the Post Graduate School at IARI had conferred 5079 Ph.D. degrees, 72 M.Tech. Degrees, and 4444 M.Sc. degrees on students, including 487 foreign students. Through training initiatives supported by the ICAR, DBT, DST, and other organizations, the Institute has also provided instruction in specific fields of agricultural sciences. IARI has trained a significant number of people in agricultural physics, microbiology, molecular science, plant pathology, soil science, and water science and technology. For their tireless efforts to enhance the teaching of many disciplines, the Institute's scientists have been given the Best Faculty Awards for excellence in teaching. The faculty has been inspired to enhance their instruction by these honors. World-class library and lab facilities are offered, and the courses are often evaluated and updated. The success of IARI students, who almost always make up the majority of the candidates chosen through national competitions, is a result of these efforts. Students at IARI consistently place at the top of merit lists.

The system of agricultural universities: State Agricultural Universities, or SAUs, are autonomous state-level universities that were developed in the 1960s as an important part of NARS. These were created in accordance with the laws passed by the state legislatures concerned in order to integrate agricultural research, education, and extension at the state level. Under the direction of Dr. S. Radhakrishnan, the University Education Commission suggested that rural (agricultural) universities be established in India along the lines of the Land Grant System of Agricultural Universities in the USA. The first and second Joint Indo-American Teams in 1955 and 1959, the Ford Foundation Study Team in 1959, the Cumming's Committee on Agriculture Universities in 1960–62, a formal resolution of the government of India, and a policy decision of the Planning Commission on Education in 1964–66 all contributed to strengthening the Commission's recommendations. the Administrative Reforms Commission's Agricultural Study Team in 1967 and the National Commission on Agriculture in 1975. According to the proposals of the University Education Commission and other expert groups, agricultural universities should be established at Tarai (Uttar Pradesh), Haringhatta (West Bengal), Patna (Bihar), Bubhneshwar (Orissa), Cochin (Travancore), and Anand (Bomaby State). Rudrapur in Tarai, now Pant Nagar, became the site of India's first agricultural university in 1960. HW Hannah created the blueprint for such a university's construction in 1956. More states have requested these universities from the Indian government. In response to these requests, the Punjab Agricultural University (PAU) in Ludhiana was founded in 1962, and other institutions of this type also emerged [9].

General universities have strong departments or faculties in a range of agricultural and related topics: Through their network of regional research laboratories, scientific institutions such as the Council of Scientific and Industrial Research (CSIR), the Bhabha Atomic Research Centre (BARC), and others are supporting agricultural research in fields such as agro-waste utilization, farm machinery and power, instrumentation, biotechnology, aquaculture, fisheries, post-harvest technology of agricultural produce, pesticide development, etc. For use in research by the ICAR and agricultural universities, BARC provides radioisotopes. The BARC conducts ongoing research on new plant variety creation and agricultural produce preservation. The Wasteland Development Board is evaluating the land resources available and the potential applications for these resources. Agriculture ultimately gains from this in areas like managing rainwater, preserving soil, and determining the supply of fuel wood and fodder. NARS receives forestry-related support from the Forest Research Institute.

Scientific institutions engaged in agriculture-related research: Through their numerous research programs, many central government departments are helping NARS, either directly or indirectly. By giving financial support to various organizations, the DST (Department of Science and Technology) encourages research into genetic engineering, post-harvest technology, blogs, etc. The Department of Environment is working on many ecological research projects and land development initiatives using dams. Through the Central Marine Fisheries Research Institute, other ICAR research institutes, and universities, the Department of Ocean

Development supports fisheries research in India. Additionally, it offers fellowships to create highly skilled fisheries personnel. The Department of Meteorology is heavily involved in agricultural weather forecasting.

Governmental agencies in the center: The coordinated research programs of the ICAR are being participated in by numerous private and nonprofit organizations. The involvement of private organizations in research activities was catalyzed by the Green Revolution. A large portion of private businesses are engaged in producing seeds, fertilizers, agrochemicals, and other agricultural supplies and equipment. Additionally, the Indian government has given these groups some tax breaks on the money they spend on research-related activities. Currently, nonprofit organizations are taking advantage of this opportunity by hiring scientists and other support personnel. Private and industrial sectors fund specific research programs at agricultural and general universities. These initiatives don't require any significant additions to the university's staff or infrastructure. Instead, they make use of what is already there.

4. SYSTEMS FOR AGRICULTURAL INFORMATION

A crucial national resource is thought to be information. It is essential for efficient planning of development as well as for ensuring the best distribution and exploitation of all other resources. A "information society" is how people refer to our current society. One of a nation's greatest assets for advancing its industrial, scientific, and economic development is its information centers and information systems. According to Vickery, an information system is "an organization of people, materials, and machines that serves to facilitate the transfer of information from one person to another" [10]. As a result, an information system is one whose main purpose is the conveyance or transformation of information.

Information systems include libraries, documentation centers, information centers, and all other organizations that process and disseminate information. These were created to streamline the movement of different forms of documentary information among the many users and close the information transfer and accessibility gap because knowledge is useless unless it is put to use. Information systems can typically be divided into two categories: subject-oriented (e.g., physical sciences, biological sciences, etc.) and goal-oriented (e.g., industry, defense, agriculture, etc.). As an applied discipline, modern agriculture depends heavily on the availability of a vast body of published scientific material. In the fields of agricultural and related disciplines including veterinary, fishery, and forestry, scientific literature and knowledge have proliferated thanks to advances in science and technology. "A system in which agricultural information is generated, transformed, consolidated, and received and feedback...to underpin knowledge utilization by agricultural producers," according to Roling." [11].

Worldwide, advances popular farming skills are occurring unparalleled amount. The field of agricultural sciences and technology has seen an enormous growth in information. Agriculture needs to continue growing and get better. This demands that the necessary data and information be accessible.

Information related to agriculture interacts and has a big impact on productivity. Information and expertise that is pertinent, trustworthy, and beneficial can increase productivity. Due to this, agricultural information systems are now required in order for the farming community to receive professional or scientific advice on time. To increase their productivity and competitiveness, farmers require timely assistance from experts. To meet the growing expectations from agri-communities and agri-business, new agricultural information systems are required. To operate their farms, growers must acquire and process financial, meteorological, technical, and regulatory information. To promote efficiency and boost the performance of the economy, timely and accessible information must be provided. Therefore, agricultural technological advancement is essential for a nation's total economic success.

5. INFORMATION SYSTEMS FOR INTERNATIONAL AGRICULTURE

In the early 1970s, the Foodstuff and Farming Body of the UNO launched two worldwide evidence schemes: CARIS (Current Agricultural Research Information System) and AGRIS (International Information System for the Agricultural Sciences and Technology). The member nations were asked to work together on their project.

AGRIS, an acronym for the Global Agricultural Sciences and Technology Information System It is afarming literature from across the world that represents research findings, food production, and rural development to assist users in identifying issues with every part of the global food supply. Nearly 240 national, international, and intergovernmental centers engage in the cooperative, decentralized AGRIS system [12]. It gathers and disseminates up-to-date knowledge on global agricultural literature that appears in various form. Each nation that takes part in AGRIS contributes data regarding papers published on their soil and, in turn, makes use of the data contributed by other nations. Within this global information system, FAO serves as a coordinating body, promoting the interchange of agricultural data among its member nations.

Among AGRIS's primary products are:

(i) Monthly printed bibliography organized into categories called AGRINDEX
(ii) Online database for AGRIS is available.

There are full text documents on the web that correlate to a certain number of bibliographical entries that are readily retrievable. The AGRIS search engine provides access to the AGRIS repository and allows retrieval of the bibliographic information kept there. The AGROVOC thesaurus is used in AGRIS to index data. With the assistance of FAO member nations, the extensive multilingual agricultural thesaurus AGROVOC was created. It is employed in agricultural information systems to index data. In 1982, major draft of AGROVOC was created and disseminated to all AGRIS centers. The FAO updates the AGROVOC vocabulary in conjunction with each member nation. You can access the revised AGROVOC online.

AGRIS committed to CIARD in 2009, and it asks for actions to optimize the public advantages brought about by financial support for agricultural R&D. Information should be "available," "accessible," and "applicable" to the broader public, according to the core principle of AGRIS portal. AGRIS is still exploring ways to improve online accessibility of agricultural, technological, and scientific information.

6. AGNIC, the AGRICULTURE NETWORK INFORMATION CENTRE

Users get access to pertinent agricultural data, subject-matter experts, and other services through a distributed network called AGNIC [13]. The shared resources on the AGNIC portal, which encourages resource sharing, benefit all members. They are as follow –

- **AgDB** is a database that connects and lists over a thousand different systems websites that provide information about agriculture. It is an information system, dataset, and database directory of high-quality agricultural.
- AgCalis a major information hub that connects to online information about agricultural conferences, meetings, and seminars of scientific value.
- **AgExp** is a database of authorities in disciplines related to agriculture. http://www.agnic.org/experts/
- A directory of websites that provide information about agriculture is called DirAgIR. DirAgIR refers to online directories of agricultural information resources that are subject- and location-specific.
- OnRef is a service provided by the Agriculture Network Information Centre that provides online references.
- The ProMED project (Federation of American Scientists) and the Agriculture Network Information Centre are partners on the PD.A plant diseases announcements service.

For agricultural experts, especially those from poor nations like India, AGNIC is immensely helpful [14].

A CRIS is a current research information system: Information on ongoing and recent forestry-related research projects as well as educational initiatives, food and nutrition, and agriculture is recorded and presented using the U.S. Department of Agriculture's Current Research Information System. State agricultural experiment stations, land grant colleges, USDA research agencies, and other cooperating state institutions are just a few of the entities that run or provide funding for the initiatives. CRIS's goal is to make information easily accessible to users while keeping track of study besides agriculture research and education initiatives of the USDA and States. The majority of the database, which was once solely accessible to researchers, research administrators, and government employees, is now freely open to all Internet users [15].

CAB International (CABI): A non-profit intergovernmental organization called CAB situated in Wallingford, United Kingdom. The Commonwealth Agricultural Bureau, or CABI, was founded in 1910 and used under that name until 1986. CABI is currently active in more than 70 nations [16].

7. INDIAN NATIONAL AGRICULTURE INFORMATION SYSTEMS

National information infrastructure is a term used to describe a nation's capacity to make knowledge and information accessible for wider use. The National Information System is a group of interconnected organizations and individuals that offers particular user categories with information and advisory services pertinent to their shifting requirements and capacities. Following are the seven components of a "National Information System" that Pauline Atherton has highlighted–

- "A nucleus of physical information resources (libraries, documentation centers, information analysis centers, etc.);
- A supply of trained information personnel;
- Linkages to personnel information sources, i.e. to technical consultants, scientists, engineers, and technologists in higher education, research and development establishments, technological institutes and other technical units;
- Linkages of scientific decision making bodies, government agencies, economic sectors, educational institutions, research and development establishments and technological institutions;
- Two-way communication channels with users;
- An organizational system that brings together and energizes these resources, personnel, and linkages; and
- National policies that promote the systematic development of the infrastructure" [17].

India takes for emanative system for farming info. The foremost agency in the nation responsible for coordinating and advancing agricultural research and educational initiatives is the ICAR, or Indian Council of Agricultural Research. It offers consultation services and acts as a data bank for nearly all agricultural sciences and associated sectors. The ICAR established the It offers datasets on institutional research initiatives, deputation reports, and proposals for the A.P. Cess Fund. FAO's AGRIS and CARIS agricultural databases' national input center is called ARIC. The SAARC Agricultural Information Centre (SAIC) has its national focal point at the ARIC. Everyone should be able to easily access the massive library resources spread across the nation and beyond thanks to the country's National Information System in Agricultural Science.

The bulk of national information infrastructures are developed in stages, with the first phase being the introduction of organized capitals. The following list includes the primary components of the national agriculture information system-

8. INDIAN AGRICULTURAL RESEARCH INSTITUTE'S LIBRARY

IARI Library is home to more than 6 lakh publications. It is one of South East Asia's biggest and greatest agro-biological libraries. The Library employs 2,000 individuals, including students, scientists, and technical staff. Additionally, 8,000 people can stay there annually. The major objective of the library is to support the outreach, teaching, and research initiatives of the institute. Visitors to the library from all across India include researchers, staff members, managers, technologists, and others who are interested in agricultural literature The Library acts as the national archive for works produced by CGIAR institutes,. IARI Library has been designated as a National Agricultural Research Database input center as part of the AGRIS initiative. Additionally, the library offers a range of documentation services, such as the publication of topical and subject bibliographies [18].

Mangla [19] has suggested that the IARI Library at Delhi because of its large and rich document collection and services, should be declared as the National Agricultural Library of India.

9. INFORMATION SYSTEM FOR AGRICULTURAL RESOURCES

Through a central sector program named the Agricultural Resources Information System (AgRIS), DAC& Ministry of Agriculture, Government of India, is enhancing and promoting its agricultural information system. It is

an e-government initiative to promote sustainable resource use, poverty reduction, and agricultural growth at the local level in India. The National Informatics Centre's Agricultural Informatics section is in charge of carrying out this project. By giving It is being adopted to develop an information management culture at the NARS, giving agricultural scientists systematic access to research data that is available in India and other nations, enhancing project management for agricultural research, and modernizing office equipment...[20].

10. ARISNET

The International Service for National Agricultural Research (ICAR) and a panel of specialists presented some key guidelines for carrying out this program. The ARIS has the four modules listed below [21]

i. **System for Financial Information on Agricultural Research (ARFIS)** - To automate monthly accounts beginning at the voucher level.
ii. **Information System for Agricultural Research Libraries (ARLIS) -** As part of ARLIS, new databases on Indian agricultural and socioeconomic research and development will be produced and made available over the World Wide Web (WWW). This will allow Indian agricultural scientists to access worldwide databases and scientific material online. More and more CD-ROM libraries are being created, all of which will be accessible in one location.

E-prints: E-prints is the name of the Indian Agricultural Research Institute's. The farming study productions of IARI scientists and researchers are uploaded and self-archived. Those who are interested can easily get this information [22].

11. PORTALS FOR INFORMATION ON AGRICULTURE

Modern ICTs are essential for the growth of agribusiness and sustainable agriculture. Portals for farming info offer a wide range of information to rural communities as well as prospects for business in such locations. The portals must be easy to use and present, and they must be adaptable to a wide range of uses, including information and communication about commerce and business. Below are some examples of various types of portals-

- **E-choupals are available at http://www.echoupal.com.** - ITC Ltd. is attempting to connect urban and rural India with their e-choupal effort. Information kiosks with PCs and internet connectivity are available in important rural locations. The farmers can use it to order agricultural inputs like seeds and fertilizer as well as learn about proper farming techniques and mandi costs. This helps farmers get a greater price for their produce while also enhancing the quality of their output. Within a 5-kilometer radius, each kiosk provides services to an average of 600 farmers in 10 neighboring communities. The e-choupal is used by farmers to order fertilizer and herbicide, monitor weather forecasts, check crop prices at the nearby government-run market, and email an agronomist with any questions.
- **Tarahaat.com is available at this link. (http://www.tarahaat.com)** - It is a simple kind of a portal intended to link rural Indian communities with the rest of the world. With the opportunity to email specialists for advice. As a service, it offers daily pricing variations in the nearby enlisted mandis.
- **Digital resources**

E-resources include things like online databases, CD-ROM databases, e-journals, and more. In agricultural sciences, CD-ROM databases are extremely prevalent. Numerous bibliographical and other databases, like AGRICOLA, AGRIS, CAB Abstracts, etc., are frequently used in CD-ROMs.

Online dictionaries

- **FAOSTAT:** The Food and Agriculture Organization's free statistical database. For almost 200 nations, FAOSTAT offers time-series and cross-sectional statistics on food and agriculture.
- Several target nations, mostly in sub-Saharan Africa, are developing and implementing FAOSTAT, also known as Country **FAOSTAT**. In addition to providing a facility for data storage at the national and sub national levels, it also provides a two-way data exchange mechanism between nations and the

FAO. It can be found at this address: http://faostat.fao.org/default.aspx.

- **AGRICOLAR CENSUS DATABASE:** A free online statistical database is offered by the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. This is a nationwide database that contains statistics on agriculture at the level of the nation, the state, the district, and the tehsil. You can get it by going to - http://agcensus.dacnet.nic.in/.

12. SERVICES FOR ELECTRONIC COMMUNICATION

The functions of mailing lists are the same as that of newsgroups, but as the system works using e-mail, there are certain differences in the way in which information professionals can make use of it. Newsgroup can be joined from the list provided on the Internet without putting any request but for joining a mailing list request is to be put on an appropriate e-mail address. The mailing lists have an owner who works as a key functionary for the list. These various key functions are subjects to be discussed in the mailing list, any particular post be permitted or not and stopping discussion on a topic if it is observed that it has been discussed a lot. So the posts are more focused in mailing lists in comparison to newsgroups because of close ended approach. Example of mailing lists in agriculture are enumerated below **–**

- Ag Center News Listserv by U.S. Environmental Protection Agency (EPA): It sends email notifications to subscribers when news about agriculture from EPA is updated on the Ag Center website.
- Sustag-Principles: Sustag-Principles is a listserv to discuss the principles underlying development of sustainable agricultural systems.
- Bulletin Board Systems (BBS)
- Agriculture Electronic Bulletin Board (AgEBB) is a service being rendered by University of Missouri

Service for the Table of Contents is a type of current awareness service which keeps us up-to-date about information in latest journal publications and other important resources in the field. ALA glossary gives following definition of TOC, “In a book, a number of periodical, etc., a list of its parts, such as chapter titles and periodical articles, with references by page number or other location symbol to the place they begin, and in the sequence in which they appear” [23].

- **Agriculture, biology, and environmental sciences are current topics. Access to the table of contents, abstracts, bibliographic data, etc. of more than a thousand specialized journals is provided by the service**.
- **Alerting service for Agricultural and Biological Sciences Journals** is available under Life Sciences on Science Direct.
- **Web 2.0**

The first wave of the web was inextricably linked to the browser; the second wave extended applications across the web and gave rise to the so-called Web 2.0 services. In her piece titled "Fragmented Future" from 1999, Darcy DiNucci introduced the idea of "Web 2.0." Tim O'Reilly is more closely associated with the expression, though, thanks to the 2004 O'Reilly Media Web 2.0 conference.

Web 2.0 is shorthand for a new breed of interactive applications, most of which are accessible via a web browser. It has made the Web more interactive, collaborative, user centered and interoperable. Now Web is a platform to interact and collaborate with each other in a virtual community rather than passive viewers as in websites. Examples of Web 2.0 tools are blogs, wikis, social networking sites and RSS feeds, etc.

- **Blogs**

There are many search engines such as Bloglines, BlogScope, and Technorati, etc. for searching the available information over the blogs:

- Farm communities (**http://www.farmcommunities.com):** It is a blogging website focused on the importance of eco-friendly agriculture and sustainable living.
- Ecology Alert (**http://ecology-alert.blogspot.com):** It is a blog concerned for the protection of the environment and nature.

Wikis

- Agropedia (**http://agropedia.iitk.ac.in):** Agropedia is a comprehensive,

integrated model of digital content organization in agricultural domain.

- Appropedia (**http://www.appropedia.org/):** It is a wiki with agriculture content focused on sustainable agriculture, urban agriculture, and food production.
- **RSS Feeds:** RSS stands for a number of commonly used definitions, including "Rich Site Summary," "Really Simple Syndication," and "RDF Site Summary.". It is basically a family of web feed formats used to deliver changing web contents regularly. It provides an unobtrusive means of updating web users of predetermined content. The contents of websites which are regularly updated such as news related sites, weblogs, etc are syndicated as an RSS feed to get latest information. Feed readers are used to view RSS feeds. 'Web based' and 'Desktop based' are the two categories of feed readers. Every type has advantages and disadvantages. online-based feed readers conserve server space by removing each post from the online feed or by giving instructions whether the user needs to save any summaries. Every web feed post is immediately saved by computer or desktop-based feed readers, which also let users search previously harvested feeds using keywords.

13. SOCIAL NETWORKING SITES

Farmers for the Future: A network for Young and Beginning Farmers: The website enlists 100 best networking sites for the farmers. (http://farmersforthefuture.ning.com/profiles/blogs/100-best-social-network-sites)

14. CONCLUSION

The foundational industry of agriculture is the backbone of the economies of developing countries. It is crucial in the fight to end hunger and malnutrition. To fulfill the demands of a population that is always expanding, agricultural productivity must be increased. The advancement of agriculture is essential to a nation's socioeconomic and political development. A requirement for encouraging farming and raising agricultural output is agricultural research. Through the ongoing availability of better production technologies, it results in greater production. The National Agricultural Research System (NARS) was created in India. The Indian NARS is based in ICAR, the nation's premier organization for funding, advancing, and overseeing agricultural research and education initiatives. A large body of basic and applied science research is used in modern agriculture, which is an applied science. Due to its interdisciplinary nature, agricultural scientists may find a wide range of literature to be of interest. Scientists must have access to the vast and ever-growing body of agricultural data in order to gather the information they need. It is important to inform the actual users of agricultural science and technology developments. Information's worth and significance are dependent on how it is used. Information must constantly flow in order to boost productivity and boost the economy's performance. To close the information transfer and accessibility gap, information systems are created. Libraries, documentation centers, information centers, and all other organizations that process and disseminate information are included in information systems. Application of knowledge and information is a major factor in a nation's progress. Agriculture technology transfer is a requirement for increasing agricultural output. For the purpose of granting access to knowledge in each area of specialization within the agriculture sector, there are several national and international information systems and services in operation., farmers, and researchers are all served by the information systems. The foundation of India's Agricultural Information System is the network of libraries and information centers connected to the institutions that make up the Indian National Agricultural Research System.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Whelan S. Fulfilling the promise: The role for agricultural research. Sir John Crawford Memorial Lecture, CGIAR, Oct 29, 2003, Nairobi, Kenya: CGIAR; 2003. Retrieved on February 16, 2011. Available:http://www.cgiar.org/pdf/crawford2003_final_eng.pdf
2. Chhotey Lal. Agricultural libraries and information systems: A handbook for users. New Delhi: R.K. Techno Agency. 1998;186.

3. India. Ministry of Information and Broadcasting. India 2012: A reference annual. New Delhi: The Author. 2012;71.
4. Arunachalam S, Umarani K. Mapping agricultural research in India: A profile. Current Science. 2001;81(8):896-906.
5. Beye G.Impact of foreign assistance on institutional development of national agricultural research systems in Sub-Saharan Africa. Special Programme for African Agricultural Research, FAO, Rome. 2002;13.
Retrieved on March 17, 2011.
Available:ftp://ftp.fao.org/docrep/fao/005/y4349e/y4349e00.pdf
6. Randhawa MS.Agriculture research in India (2nd Ed.). New Delhi: ICAR. 1963; ii-v.
7. Balaguru T, Raman KV. Agricultural research system in India. In Raman, KV, Anwar MM, Gaddagimath RB. (Eds.). Agricultural Research Systems and Management in the 21st century" Proceedings of the International Seminar, NAARM, Hyderabad. Hyderabad: NAARM Alumni Association. 1987;99.
8. Indian Council of Agricultural Research web site, Retrieved on August 27, 2023.
Available:http://www.icar.org.in/
9. Sukhdev Singh. Agricultural universities system in India. In Raman, KV, Anwar MM, Gaddagimath RB. (Eds.), "Agricultural Research Systems and Management in the 21st Century" Proceedings of the International Seminar, December 8-10, 1987, NAARM, Hyderabad. 1988;123-134. Hyderabad: NAARM Alumni Association.
10. Vickery BC. Information systems. London: Butterworths. 1973;1.
11. Roling NG. Extension science: Information system in agricultural development. Cambridge: Cambridge University Press. 1988;33.
12. AGRIS - International Information System for the Agricultural Sciences and Technology. Knowledge for Development website; 2006. Retrieved on March 19, 2018.
Available:http://knowledge.cta.int/en/Dossiers/S-T-Issues-in-Perspective/ICM-Strategies2/Links/Worldwide/AGRIS-International-information-system-for-the-agricultural-sciences-and-technology
13. Tripathi A. AGNIC: Agriculture Network Information Centre. DRTC Annual Seminar on Electronic Sources of Information; 2000. Retrieved on March 20, 2023.
Available:https://drtc.isibang.ac.in/bitstream/handle/1849/145/BD.pdf?sequence=2
14. National Agricultural Library (U.S.) web site, Retrieved on April 25, 2023.
Available:http://www.agricola.nal.usda.gov/help/aboutagricola.html
15. United States Department of Agriculture web site, Retrieved on April 25, 2023.
Available:http://www.cris.csrees.usda.gov/aboutus.html
16. Centre for Agricultural Bioscience International (CABI) web site, Retrieved on April 5, 2013.
Available:http://www.cabi.org/
17. Atherton P. Handbook for information systems and services. Paris: UNESCO. 1977;1-3.
18. Indian Agricultural Research Institute web site, Retrieved on April 20, 2023.
Available:http://www.iari.res.in/
19. Mangla PB. Agricultural libraries in India: An overall view - key note address. Journal of Library and Information Science. 1988; 13(2):97-108.
20. Agricultural Resources Information System web site, Retrieved on March 15, 2023.
Available:http://www.agris.nic.in/agrisintro.htm
21. Sharma SD. Agricultural information management: Systems and services. IAALD Quarterly Bulletin. 2003;48(1/2):36-41.
22. E-prints@IARI web site, Retrieved on April 30, 2023.
Available:http://eprints.iari.res.in/
23. Young, H. (Ed.). ALA glossary of library and information science. Chicago: ALA. 1983;224.

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