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Use Patterns of E-Resources by the Scientists of Indian Institute of Millet Research (IIMR), Hyderabad: A Case Study

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Abstract

This study explores the adoption and usage of electronic information resources among scientists at the Indian Institute of Millets Research (IIMR), Hyderabad, Telangana, highlighting a digitally proficient academic environment. All participants reported full awareness and active engagement with platforms such as electronic journals, institutional repositories, and e-books, emphasizing the essential role these tools play in modern agricultural research. The findings reveal that while digital literacy and resource dependency are high, several challenges, primarily technical limitations like slow Internet speeds and outdated hardware, impede optimal usage. To enhance research efficiency and digital engagement, the study recommends strategic interventions, including improvements in Internet infrastructure, hardware upgrades, and expanded technical support. Additionally, the deployment of trained library and IT personnel, along with targeted capacity-building programs in information and communication technology (ICT), can empower the scientist community to fully leverage digital tools. By addressing these gaps, IIMR can strengthen its research capabilities and foster a more robust, self-sufficient digital research ecosystem.

Keywords: e-Resources, Information Seeking Behaviour, Information Use Patterns, Agricultural Scientist.

1. Introduction

India, part of the South Asian sub-continent, ranks as the second-largest producer of agricultural output globally. The nation has a rich agricultural heritage that traces back to the Indus Valley Civilization. Agriculture remains the backbone of India's economy and plays a vital role in shaping the cultural and socio-economic structure of the country. Its importance is underscored by its deep interconnection with the industrial sector, forming a significant link in both supply and demand chains. In the era of the digital revolution, Information and Communication Technology (ICT) has become a key driver in advancing agricultural development, as well as enhancing agricultural education and research. Electronic resources such as online databases, e-books, and digital journals are examples of ICT applications that provide users with organized and accessible information. These resources, available in digital formats, offer convenient access to large volumes of information from any location, allowing

multiple users to engage with the content simultaneously. Compared to traditional print materials, digital access allows for quicker and more efficient information retrieval.

To effectively utilize these electronic resources, users must engage in thoughtful information use patterns, requiring higher-order cognitive skills to process and apply new knowledge. The integration of ICT has introduced innovative formats and methods for accessing information, significantly transforming how agricultural knowledge is consumed and applied. To support seamless access to agricultural information across research institutions, the Indian Council of Agricultural Research (ICAR), in collaboration with the National Agricultural Research System (NARS), has developed several digital initiatives. These include platforms such as the Consortium for e-Resources in Agriculture (CeRA), e-GRANTH (a project aimed at strengthening digital library services within NARS), and Krishikosh (an institutional repository of agricultural knowledge). These initiatives are instrumental in expanding the reach and efficiency of agricultural research and education in India.

1.1 Background of the study

Farming has long stood at the heart of India's economy, cultural identity, and daily life. A large share of the country's population lives in rural areas and depends on agriculture for survival. As a result, research in this field plays a key role in ensuring food availability, encouraging sustainable growth, and supporting national development. Over the years, farming methods have gradually shifted from traditional practices to more advanced, tech-based systems, with information and communication technology (ICT) driving much of this transformation.

In recent times, the use of electronic resources, commonly referred to as e-resources has changed the way agricultural researchers' access, process, and share knowledge. Tools such as digital journals, online databases, institutional repositories, and e-books have made scientific information more accessible and easier to use. Efforts by the Indian Council of Agricultural Research (ICAR) and the National Agricultural Research System (NARS) have led to the creation of platforms like CeRA, Krishikosh, and e-GRANTH, which aim to provide seamless access to digital content across agricultural institutes.

However, even with these tools in place, questions remain about how well agricultural scientists are making use of them. This study intends to explore how e-resources are being used, the extent of their impact, and the obstacles that might hinder their effectiveness. In doing so, it aims to highlight how digital tools are helping to advance research and improve the sharing of agricultural knowledge.

1.2 Indian Institute of Millets Research (IIMR) and IIMR Library

ICAR-Indian Institute of Millets Research (IIMR) was founded in December 1969 at the IARI campus in New Delhi. It was moved to the IARI Regional Station in Hyderabad in 1970. In 1987, the National Research Centre for Sorghum (NRCS) was established at the IARI Regional Station in Hyderabad, and the All-India Coordinated Sorghum Improvement Project (AICSIP) was integrated with it. In 2009, the NRCS was expanded to become the Directorate of Sorghum Research (DSR). The institution was expanded in 2015 to become the Indian Institute of Millets Research (IMR). A leading agricultural research organisation, IIMR conducts fundamental and operational studies on sorghum and other millets. Through All India Coordinated Research Projects on Sorghum, Pearl Millet, and Small Millets, IIMR organises and integrates sorghum research at the national level and establishes connections with numerous international organisations.

2. Review of Literature

Mishra and Panda (2022) evaluated the range of e-resources available to users at agricultural universities in India. The study found that, users of agricultural university libraries in India have made fair use of library and information resources in terms of using e-databases, topic gateways, and e-resources from other institutions, still some areas require user education and information literacy campaigns to improve awareness among the users. The study suggestedto effectively use the funds by buying the e-resources and using them by creating appropriate information literacy campaigns and user education programs. Agoh, Annune, and Idachaba (2021) studied the use of library information services and their impact on research productivity among agricultural scientists in Nigeria. Surveying 701 respondents, they found high usage of library services, with most resources scoring above 2.50 in utilization. No significant difference in research output was observed between scientists in universities and research institutes. The study recommended better use of library e-resources to boost productivity.

Puneeth (2021) studied students' awareness and use of e-resources at the University of Agricultural Sciences, Bangalore. While most students were aware of these resources, the study recommended improved user training, librarian support, and awareness programs to enhance effective usage for academic success. Mohammed et al. (2021) surveyed 430 agricultural scientists in North Central Nigeria and found that electronic databases boosted research output. They recommended improving internet bandwidth and providing backup power to enhance effective use of these resources. Neena Singh (2020) analyzed the use of the CeRA platform at Pant University and found fluctuating engagement among users. Despite CeRA's value, many preferred alternative sources. The study recommended promoting awareness and addressing access barriers to improve effective use of consortium-based resources. Ilo et al. (2019) found that although agricultural scientists in Benue State widely used available library resources, their research output remained low. The study recommended enhancing services like selective dissemination of information and bibliographic support to improve research productivity. Madhu (2019) surveyed 207 scientists from South Indian Plantation Crops Research Institutes and found high usage of electronic journals, especially open access sources. The study recommended regular training and stronger library support to enhance awareness and effective use of resources like CeRA and other online databases.

Nayak, Panda, and Kar (2018) studied the use of CeRA e-journals by NRRI scientists and noted that while CeRA offers valuable access to agricultural journals, it alone cannot account for improvements in research output due to limited coverage of all relevant publishers and journals. Folitse et al. (2017) found that most CSIR agricultural scientists in Ghana learned internet skills informally and mainly used the internet for research. The study recommended improving internet access and speed by increasing bandwidth and ensuring reliable connectivity in all research institutions.Nisha and Varghese (2016) found that most agricultural scientists were familiar with digital sources but relied on basic search methods, rarely using advanced techniques. Older scientists faced challenges adopting new technologies. The study recommended informal training and workshops to improve e-resource usage and search skills.

3. Need for the Study

In today’s fast-evolving research environment, access to accurate and timely information is essential for scientific progress. The traditional methods of accessing information, like printed journals and physical libraries, are no longer sufficient to meet the demands of modern research. Electronic resources have emerged as powerful tools that provide quick, organised,

and remote access to academic content. Digital platforms are making it easier to retrieve and use scholarly material efficiently.

Despite these advantages, not all scientists may be fully utilising these digital tools to their maximum potential. Factors such as limited training, lack of awareness, Internet connectivity issues, or institutional barriers may hinder effective use. Understanding how researchers are engaging with e-resources can help identify gaps, improve digital literacy, and ensure that the investments made in digital infrastructure translate into real research impact. This study is therefore necessary to explore the current patterns of e-resource usage among agricultural researchers, understand the obstacles they face, and assess the overall contribution of digital tools to agricultural innovation. Insights from this research can guide policy decisions, enhance resource planning, and promote better access to knowledge for those working at the forefront of agricultural development.

4. Research Problem

In the digital age, access to timely and relevant information is fundamental for the progress of scientific research, particularly in agriculture, a sector that directly influences food production, rural livelihoods, and national development. Although electronic resources are widely available in agricultural research institutions, their actual usage remains unclear. Some scientists actively use these tools, while others may be limited by a lack of awareness, digital skills, or institutional support. This uneven usage suggests that the full benefits of e-resources, such as improved research efficiency and better knowledge sharing, are not being fully realised. There is a clear need to understand how these resources are being used, what barriers exist, and how they impact researchers' work. Without such insight, efforts to strengthen digital access and support systems may fall short of their potential.

5. Scope and Limitations of the Study

This study focuses on examining the use of electronic resources by scientists working in IIMR, Hyderabad. It aims to assess how digital tools are accessed, the extent to which they are used, and the challenges researchers face in utilising them effectively. The study also seeks to understand the role of e-resources in supporting research quality, collaboration, and information sharing.

6. Objectives of the Study

The present study aims to achieve the following objectives:

a) To identify the preferred locations for accessing e-resources by the scientists of IIMR.
b) To examine the prioritized use of databases for millet research by the scientists of IIMR.
c) To determine the preferred types of e-resources used by the scientists of IIMR.
d) To assess the awareness and usage of CeRA and KrishiKosh services.
e) To identify the problems encountered by the scientists of IIMR in using e-resources.

7. Research Methodology

To fulfil the objectives of the study, a structured questionnaire covering relevant aspects of the study was distributed to all the scientists of IIMR, Hyderabad, Telangana. A total of 37 questionnaires were distributed to the scientists of IIMR, and the investigator has received 33 filled questionnaires from the scientists of IIMR. This constitutes 89.18% of the total response.

Data collected through the structured questionnaire were organised and presented in the form of tables to draw relevant interpretations. Responses were analysed using descriptive statistics, including frequencies, percentages, and weighted averages (WA). Key formulas used are:

Percentage

$$\text{Percentage} = (\text{Total Responses} \div \text{Category Count}) \times 100.$$

Weighted Average (Likert scale)

$$WA = \frac{\sum(f_i \times w_i)}{N}$$

where F_i is frequency and w_i is the weight (e.g., 5 = Strongly Agree)

8. Data Analysis and Interpretation

Demographic details, including general information such as gender and educational qualifications of the respondents who participated in the study, are presented in Table 1. The table shows that 78.8% of the respondents were male, while 21.2% were female. Regarding educational qualifications, a significant majority (93.94%) of the respondents held Ph.D. degrees, while the remaining 6.06% had M.Phil. degrees. This distribution clearly indicates that the research environment at IIMR is highly advanced, with most scientists having attained the highest level of formal education in their respective fields. Furthermore, Table 1 reveals that all respondents (scientists) at IIMR are aware of and use electronic information resources in their research activities.

Table - 1: Summary of respondents

		Respondents (n=33)	%
Gender			
	Male	26	78.8
	Female	7	21.2
Academic Qualification			
	Master Degree	0	0
	M.Phil.	2	6.06
	Ph.D.	31	93.94
Awareness on electronic information resources and services			
	Aware	33	100
	Not Aware	0	
Awareness & Utilization of CeRA			
	Aware & Use	33	100
	Not Aware	0	
Awareness & Utilization of KrishiKosh			
	Aware & Use	33	100
	Not Aware	0	

A review of the data in Table 2 reveals the preferred locations where IIMR scientists access electronic resources. The department or office emerges as the most preferred access point for all scientists. Notably, a significant proportion (78.79%) also access e-resources from home, indicating a flexible work environment that facilitates remote access. Additionally, a few scientists (24.24% each) utilize the Computer Lab/Computer Centre and the ARIS

(Agricultural Research Information System) Centre for accessing electronic information. Interestingly, the Library or Department Library is the least preferred location for accessing e-resources.

Table - 2: Location of accessing electronic information resources

SN	Location of accessing e-resources	Respondents	%
1	Department / Office	33	100
2	Home	26	78.79
3	Computer Lab / Computer Centre	8	24.24
4	ARIS (Agricultural Research Information System)	8	24.24
5	Library / Departmental Library	1	3.03

An analysis of the data in Table 3 highlights the usage of specific electronic resources and databases that support the respondents' research activities. CeRA and Springer Link were found to have the highest usage (100%), followed closely by AGRICOLA, AGRIS, and Web of Science (96.97%). CAB Abstracts, J-Gate, and PubMed (93.94% each), as well as SciFinder and ScienceDirect (90.91%), also reported high usage. KrishiPrabha and ProQuest Science were used by 87.88% of the respondents, followed by KrishiKosh (84.85%) and Shodhganga (81.82%). Overall, the analysis suggests a very high level of electronic database usage among the scientists at IIMR.

Table - 3: Usage of specific electronic resources/databases

SN	Electronic Resources / Databases	Respondents	%
1	CeRa	33	100
2	Springer Link	33	100
3	AGRICOLA	32	96.97
4	AGRIS	32	96.97
5	Web of Science	32	96.97
6	CAB Abstract	31	93.94
7	J-Gate	31	93.94
8	PubMed	31	93.94
9	SciFinder	30	90.91
10	Science Direct	30	90.91
11	KrishiPrabha	29	87.88
12	Pro-Quest Science	29	87.88
13	KrishiKosh	28	84.85
14	Shodhganga	27	81.82

Table - 4: Preferred e-resources for research

SN	Type of e-resources	Respondents	%
1	Electronic Journals (Full text/ Abstracts)	32	96.97
2	Institutional Repositories	32	96.97
3	Electronics Books	30	90.91
4	E-Theses & Dissertations	30	90.91
5	Online Reference Books	27	81.82
6	E-Newspapers	26	78.79
7	CD-ROM Databases	25	75.76

Table 4 provides insights into the types of electronic resources preferred by respondents for information retrieval and research activities. The data show a strong preference for Electronic Journals (Full Text/Abstracts) and Institutional Repositories, each cited by 96.97% of participants. These are followed closely by e-Books and e-Theses & Dissertations, both with a usage rate of 90.91%. Online Reference Books were used by 81.82% of respondents, while e-Newspapers and CD-ROM Databases were preferred by 78.79% and 75.76%, respectively. These findings highlight a clear inclination among respondents toward dynamic, full-text, and institutional digital resources as primary tools for academic and scientific inquiry.

Table - 5: Degree of satisfaction about CeRA

CeRA Features	Respondents (N=33)					
	5	4	3	2	1	WA
Searching mechanism of CeRA	3 (9.09%)	27 (81.82%)	3 (9.09%)	0	0	4
Full-text download facility	9 (27.27%)	23 (69.7%)	1 (3.03%)	0	0	4.24
User-friendly interface	4 (12.12%)	26 (78.79%)	3 (9.09%)	0	0	4.03
Multi-disciplinary coverage	0	17 (51.52%)	16 (48.48%)	0	0	3.51
Mobile access	0	15 (45.45%)	16 (48.48%)	2 (5.71%)	0	3.39
Access to research journals	25 (75.76%)	5 (15.15%)	3 (9.09%)	0	0	4.66

Note: Weights assigned for values are *5-Very Satisfied, 4-Satisfied, 3-Neutral, 2-Dissatisfied, 1-Very Dissatisfied*. Values presented in the last column are associated weighted values.

The findings in Table 1 highlight the extent of awareness and utilization of the National Agricultural Research System Consortium for e-Resources in Agriculture (NARS-CeRA) among respondents. Notably, all scientists at IIMR reported active use of the CeRA platform. This universal adoption underscores the critical role CeRA plays in supporting the research activities of IIMR scientists, particularly in providing access to relevant agricultural information and scholarly resources. The data presented in Table 5 reveal varying levels of satisfaction with the NARS-CeRA platform among participants. A substantial majority (81.82%) expressed satisfaction with the search functionality (WA=4.00), indicating that it effectively supports users in locating relevant materials. The ability to download full-text resources was highly rated, with 69.7% of respondents expressing satisfaction (WA=4.24). Similarly, 78.79% found the user interface intuitive and easy to navigate (WA=4.03). In contrast, satisfaction with multi-disciplinary coverage was moderate (WA=3.51), and notably lower for mobile accessibility (WA=3.39), suggesting areas for improvement. Importantly, the highest satisfaction was reported for access to research journals (WA=4.66), highlighting the platform's significant role in meeting the academic and research needs of users.

The data in Table 1 indicate that all scientists at IIMR are familiar with and use the KrishiKosh database. Table 6 provides insights into how frequently respondents access various components of the KrishiKosh database under the National Agricultural Research System for e-resources. The data show that e-books are widely used (WA=4.27), with 60.61% of respondents reporting they "always" access them. In contrast, e-archives are used less frequently (WA=2.85), with 39.39% stating they access them "rarely." Both e-journals and reports show moderate usage: 36.36% of participants reported using e-journals either "always" or "often," and the same

percentage indicated "often" using reports. Theses emerged as the most consistently accessed resource (WA=5), with 100% of respondents stating they "always" use them. Institutional publications also saw regular engagement (WA=4), with 45.45% of users reporting "always" usage. These patterns suggest that while resources like theses and e-books are essential to research workflows, others such as e-archives may benefit from improved visibility or accessibility to increase their usage.

Table - 6: KrishiKosh resource utilization

KrishiKosh Resources	Respondents (N=33)					
	5	4	3	2	1	WA
E-Books	20 (60.61%)	5 (15.15%)	5 (15.15%)	3 (9.09%)	0	4.27
E-Archives	0	10 (30.30%)	9 (27.27%)	13 (39.39%)	1 (3.03%)	2.85
E-Journals	12 (36.36%)	12 (36.36%)	3 (9.09%)	6 (18.18%)	0	3.91
Reports	6 (18.18%)	12 (36.36%)	8 (24.24%)	7 (21.21%)	0	3.52
Theses	33 (100%)	0	0	0	0	5
Institutional Publications	15 (45.45%)	8 (24.24%)	5 (15.15%)	5 (15.15%)	0	4

Note: Weights assigned for values are *5=Always, 4=Often, 3=Sometimes, 2=Rarely, 1=Never*. Values presented in last column are associated weighted values.

Table - 7: Obstacles encountered during access to e-resources

SN	Obstacles faced by the respondents	Respondents	%
1	Downloading information from the Internet takes a long time	29	87.88
2	Difficult to read on screen	28	84.85
3	Low bandwidth	27	81.82
4	Hardware infrastructure is insufficient	27	81.82
5	Lack of trained library staff who can help the users	22	66.67
6	Limited collections of e-resources	17	51.52
7	Lack of awareness of the existence of numerous electronic databases	14	42.42
8	Power failure	11	33.33
9	Inadequate training in the use of electronic resources	5	15.15
10	Inability to use the OPAC due to a lack of knowledge	3	9.09
11	Overload of information on Internet	3	9.09
12	Lack of ICT skill	1	3.03

An analysis of the data in Table 7 reveals several key challenges faced by respondents when accessing electronic resources. The most frequently reported issue was slow download speed, with 87.88% of participants indicating that retrieving information from the Internet takes considerable time. This was closely followed by the difficulty of reading digital content on

screens, reported by 84.85% of respondents. Additionally, 81.82% cited problems related to low Internet bandwidth and inadequate hardware infrastructure.

Beyond these technical issues, 66.67% of users highlighted the lack of trained library personnel to assist with navigating e-resources. Over half (51.52%) pointed to the limited availability of digital content as a significant barrier. Other challenges, though mentioned less frequently, still impact the user experience. These include lack of awareness about existing databases (42.42%), frequent power outages (33.33%), and inadequate training in the use of e-resources (15.15%). A smaller proportion of respondents reported difficulty using OPAC due to lack of knowledge (9.09%), feeling overwhelmed by the volume of online information (9.09%), and struggling with basic ICT skills (3.03%).

9. Findings of the Study

The findings of the study offer a comprehensive view of the digital research environment among scientists at the Indian Institute of Millets Research (IIMR), revealing both strengths and areas for improvement in e-resource usage.

i. Every respondent reported awareness and regular use of electronic platforms such as CeRA, Springer Link, and AGRICOLA. This complete adoption reflects a strong digital orientation and suggests that IIMR scientists are well-integrated into contemporary academic research networks that rely heavily on electronic information systems.
ii. An overwhelming majority of the participants (93.94%) hold doctoral degrees, underscoring the institution's research-focused culture. This also implies that the users have the academic experience necessary to critically engage with advanced digital tools and scholarly databases.
iii. The major access points for e-resources among scientists are their department/office and home. This pattern highlights the importance of ensuring seamless remote access infrastructure, allowing researchers to maintain productivity beyond the physical workplace.
iv. CeRA and Springer Link emerged as the most widely used databases, with 100% of participants engaging with them. AGRICOLA, AGRIS, and Web of Science followed closely at 96.97%, reflecting the importance of multidisciplinary and agricultural-specific content in the researchers' workflows.
v. Electronic Journals (Full-text/Abstracts) and Institutional Repositories were equally favoured, each being used by 96.97% of respondents. This preference highlights the value placed on high-quality, peer-reviewed, and institutionally curated content.
vi. The most frequently cited challenge was slow Internet speeds, with 87.88% of users reporting delays in downloading content. This technical issue has a direct impact on research efficiency and underscores the need for improved network infrastructure.
vii. While awareness of CeRA was universal, satisfaction levels varied across features. Notably, 81.82% of users expressed satisfaction with the platform's search functionality, indicating it effectively supports resource discovery but still have room for enhancement in other areas.
viii. Awareness of the KrishiKosh platform was also universal, and theses and e-books were the most frequently accessed resources within it, with 100% and 60.61% of the respondents respectively stating they "always" use them. This points to a growing reliance on ETDs and digital book collections for scholarly and institutional reference.

9. Conclusion and Suggestions

The study concludes that all respondents were fully aware of and actively use electronic information resources at IIMR, Hyderabad. These points to a well-informed research community that recognises the value of digital tools in modern agricultural science. Electronic journals, institutional repositories, ETDs and e-books are the most preferred resources, underlining the importance of maintaining and expanding these collections. The scientific community at IIMR is digitally literate and heavily reliant on e-resources, which are integral to their research work. However, to unlock the full potential of these resources, technical, infrastructural, and training-related challenges must be addressed. The study suggests to investing in improving Internet bandwidth and download speeds across both on-campus and remote access points to ensure uninterrupted access to online resources. The institution should upgrade hardware resources such as computers, servers, and networking tools to support efficient access and data handling, especially for high-usage resources. It is necessary to deploy more trained library and IT staff to assist researchers in navigating databases, using search tools, and resolving access issues. Organizing workshops on advanced search strategies, effective use of databases, providing awareness of lesser-known digital repositories to enhance usage diversity and efficiency and offering skill-building modules focused on ICT and information management will help addressing the gaps in digital proficiency and online information usage.

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