

NETWORKING OF AGRICULTURAL INFORMATION SYSTEMS AND SERVICES IN INDIA*

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Abstract: The paper provides an overview on the networking of the Agricultural Information Systems and Services in India. Covers a range of issues related to Agricultural Research Information System (ARIS) of ICAR in India. It discusses in detail the Agricultural Research Information System Network (ARISNET) for India and its modules consists of Agricultural Research Personnel Information System (ARPIS), Agricultural Research Financial Information System (ARFIS), Agricultural Research Library Information System (ARLIS), and Agricultural Research Management Information System (ARMIS) and ARISNET management. It reviews the strength and development of Agricultural Libraries in India including institutional system of ICAR, State Agricultural Universities, and ICAR Institute Libraries. It also covers information technology applications in agricultural libraries and information technology infrastructure in the Agricultural Libraries in India.

1. Introduction

India is essentially an agrarian society and basically depends on agricultural outputs. It is therefore essentially that the technology thrust should lay greater emphasis on the transfer of scientific and technological information from the research institutes to its actual users. Libraries and Information Centres are playing a very important role in providing information to the users by building print and electronic collection. In India, direct application of computerized information systems to the farmers is not feasible in the present conditions. Utilization of information system has been demonstrated by Annon¹ and graphically presented in Figure 1.

* This paper is developed and it is the result of some extracts from my Ph.D. thesis on "Information Psychology of Agricultural Scientists of Rajasthan (India)" and Figures and Tables are extracted from the Thesis.

¹ Annon. Guidelines for ARIS network. ISNAR, The Netherlands, 1993.

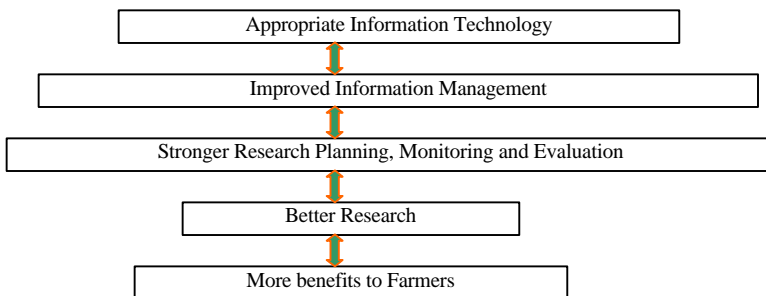


Figure 1. Flow Diagram of Information System utilization

2. Agricultural Research Information System (ARIS) OF ICAR

It is essential that scientists in the Indian National Agricultural Research System (NARS) should have a quick access to and free exchange of information at local, national and international levels. NARS through its vast network of 30,000 scientists working at ICAR's 49 Central Institutes, 10 Project Directorates (PDs), 27 National Research Centres (NRCs), 86 All India Coordinated Research Projects (AICRPs), 261 Krishi Vigyan Kendras (KVKs), 29 State Agricultural Universities (SAUs), 120 Zonal Research Stations (ZRS), one Central Agricultural University (CAU), numerous (1000 plus) regional stations and other research centers has been catering to the agricultural research and information needs of the farming community. The ICAR during eight Five Year Plan embarked upon a project called Agricultural Research Information System (ARIS) to bring the power of information technology to the NARS. Its implementation started with the financial aid from World Bank under National Agricultural Research Project (NARP).

3. The proposed Agricultural Research Information System Network

Keeping in view the total agricultural and rural development system, constraints and limitations, and information requirements at different levels, following objectives are proposed in formulating a comprehensive information system² (Fig 2.) for collective agricultural and rural development:

- Improved research and planning
- Checking the duplication of research and extension projects and programming
- Dissemination of research findings

² Report on strategy for development of an agricultural research information system (ARIS) for the Indian Council of Agricultural Research in cooperation with ISNAR, October 1994.

- Improvement of feedback mechanism
- Better coordination and linkage between and among different rural development agencies and banking institutions like Department of Agriculture (DA), Department of Rural Development (DRD), NABARD, lead banks, NGOs, and private sector
- Evolving effective information sharing mechanisms
- Electronic interface among scientists, development agents and farmers.

The project "Agricultural Research Information System (ARIS)" is being implemented to bring information management culture to National Agricultural Research System (NARS) so that agricultural scientist can carry out research more effectively by having systematic access to research information available in India as well as in other countries; for better project management of agricultural research; and for modernization of the office tools. The basic infrastructure required for linking all ICAR institutes has already been created. The E-mail connectivity has been established to 72 out of 86 ICAR institutes by linking through dial-up including six institutes with VSAT connectivity using NICNET and ERNET services.

4. Agricultural Research Information System Network (ARISNET)

To exploit the potential of modern computing power in planning and management of agricultural research and scientific communication, ICAR started an Agricultural Research Information System Network (ARISNET)³. Basic guidelines to implement this project were provided by a team of experts from ICAR and International Service for National Agricultural Research (ISNAR). A phased implementation is recommended to create infrastructure for ARISNET, a national Wide Area Network for agricultural research with its headquarters at ICAR, New Delhi. ARISNET is being implemented in phased manner as indicated in the following Figure 2.

³ Singh, Gajendra; Pal, Kuhal and Muralidhar, U. Strategies for development of agricultural research information system: ICAR experience. Paper presented in Project Planning Meeting on Research Management. ISNAR, Tsukuba, Japan, March 24-27, 1997.

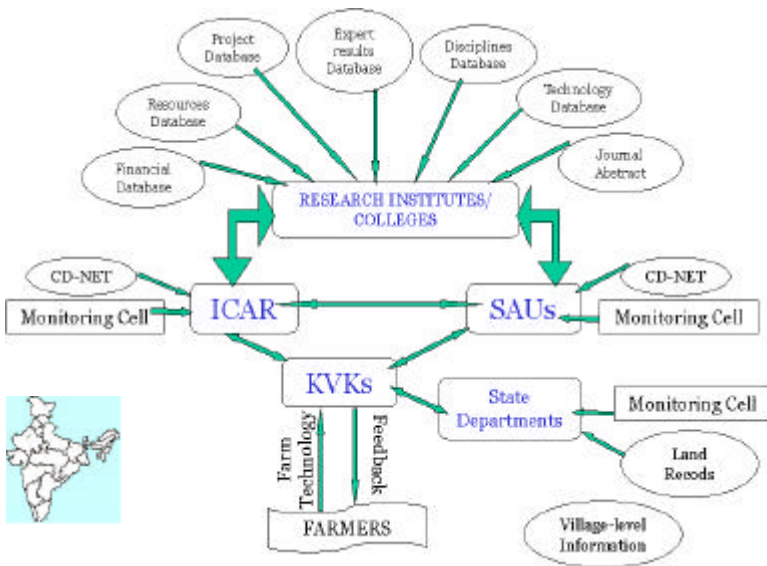


Figure 2. Information Network for Agriculture and Rural Development for India

5. Modules of Agricultural Research Information System Network (ARISNET)

Besides creating the infrastructural facilities, the four information modules in Figure 3, are designed for ARISNET⁴ to standardize usage of the different software for the day-to-day activities of the scientists and office automation. ARISNET has four information modules namely Agricultural Research Personnel Information System (ARPIS); Agricultural Research Financial Information System (ARFIS); Agricultural Research Library Information System (ARLIS) and Agricultural Research Management Information System (ARMIS).

⁴ Sharma, R.D. The Agricultural Information Network for India. New Delhi: Society for Information Science, 1989.

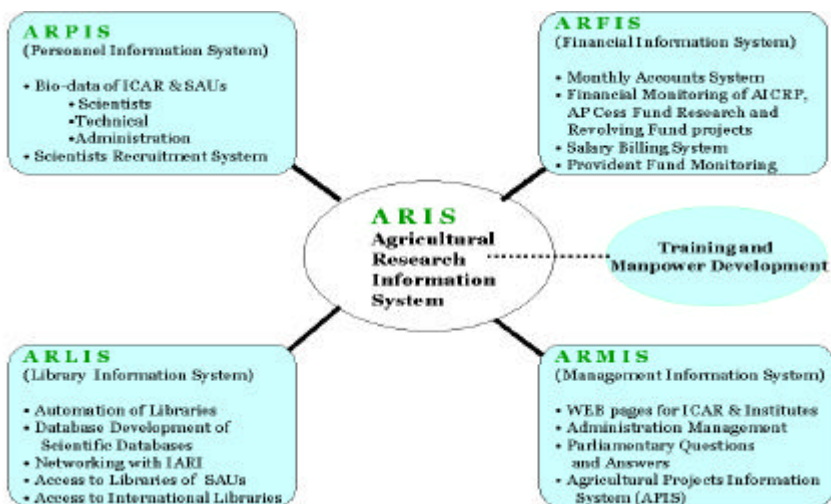


Figure 3. Modules of ARISNET

Besides modernization and networking of libraries of ICAR institutes and SAUs, the creating, databases and CDs on both national and international agricultural research information contents, will be a major work under ARLIS. Agricultural Research Information Centre (ARIC), New Delhi is involved in compilation of information on AP Cess Fund Schemes and other research projects funded by ICAR. Also ARIC is serving as National Input Centre for International Information System (AGRIS) for the Agricultural Sciences and Technology, Current Agricultural Research Information Systems (CARIS) projects of Food and Agriculture Organization (FAO) and SAARC Agricultural Information Centre (SAIC).

Table 1: Summary of Computer Equipment to be provided to State Agricultural Universities (SAUs) and ICAR Institutes under ARISNET:

Equipment		Supplied under NARP	Proposed under NATP
	32 Users	12	45
UNIX Servers	14 Users	23	20
	8 Users	23	0
Total		58	65
	32 Users	46	180
UNIX Servers	14 Users	92	83
	8 Users	92	0
Total		230	263
Workstation		745	4250
Laser Printer	Heavy Duty	0	200
	Medium Duty	230	220
Total		230	420
UPS	5K	57	0
	3K	172	300
Total		229	300
Modem	HS	115	88
	MS	230	0
Total		345	88
AC		378	126
Router/Switch		30	119
VSATs		0	140

Apart from providing wide area network services, it is essential that each campus is equipped with good local area network facilities. Under the ARISNET programme most of the ICAR and SAU's are provided with suitable servers and nodes. Six institutes are already having VSAT connectivity for more than two years and 11 more have been provided VSATs during March 1997. The e-mail connectivity has been established to 73 ICAR institutes (47 institutes, 9 PDs and 17 NRCs) out of 86 by linking these institutes through dial-up, including 17 institutes with VSAT connectivity, to the nearest National Informatics Centres (NIC), a Government owned national service provider. It expected that all of the ICAR institutes and SAUs would have Local Area Network and access to the Internet either by VSAT or by dial-up facility by the end of 1998. To provide effective satellite connectivity 140 more VSATs will be added to the network during next three years.

6. Management of ARISNET

To keep the ARIS Network up and running, it is important that a few people from each campus are provided with adequate training to manage the equipment installed at their institutes as part of the network. This will include monitoring the e-mail flow, the modem, VSAT and routine operations, the LAN and UNIX server operations, and the various software installed on the campus under project ARIS. Minor problems then can be corrected locally. Also, if the problems are beyond the capabilities reported to appropriate external agency by the management level will include networking, setting up various information servers and online databases, and administration of Novell Netware and UNIX networks. It will also include modem, VSAT and router management, basic PC hardware configuration and trouble-shooting.

In ICAR system, there are two main institutes i.e., NAARM and IASRI offering computer related courses to the scientists of the NARS. Under ARIS programme so far about 800 scientists have been provided training on topics like PC trouble-shooting, networking, e-mail, MS-Windows, library information system and general PC use. Training facilities are being further strengthened to provide computer-training courses also. The development of databases and necessary infrastructure is one side of the coin. After establishing initial infrastructure including hardware, software and networking, smooth running of the information system is entirely dependent on the type and quality of monitoring. An information system (IS) Unit consisting of Assistant Director-General (ADG), Principal Scientist, Senior Scientists and Technical staff is being created at ICAR headquarters to look after the integration of installed equipment into ARIS network. The IS Unit will also coordinate among ICAR institutes, State Agricultural Universities and Zonal Research Stations for creation of databases and to ensure free and useful information exchange over this network.

The IS Unit will also play a major role in further planning of the ARIS Network since no network is static. New nodes will come up, new services will be offered, traffic volumes will grow and new connectivity options will become available. Thus, deciding evolution strategy, creation of databases, evaluation of new connectivity options and implementation of them as and when required will be some of the major tasks of the IS Units. Creation of Monitoring Cells is also planned at each NARS institution.

7. Networking of Agricultural Institutional Information System

The State Agricultural Universities are major partners in growth & development of Agricultural Research and Education under National Agricultural Research

System. Today, the Indian Agricultural System under the ICAR is one of the largest in the world comprising of research institutes, project directorates, schemes, programmes, etc.

Table 2. Institutional System of ICAR⁵

Institutions	Number
Agricultural Universities	31
Deemed Universities	4
ICAR Institutes	45
National Research Centres	30
Project Directorates	10
National Bureau	4
All India Coordinated Research Projects	80
Krishi Vigyan Kendras	262
Trainers Training Centres	8
National Research Centre in Agriculture For Women	1
Operational Research Projects	400
Other Schemes and Projects	26

SAUs work under the control of state administration. They are founded up to 90 percent by the ICAR and rest of the their budget is met by state government. Since agricultural research, education and extension is the primary responsibility of states, the growth of SAUs has been faster.

Table 3. State wise State Agricultural Universities in India⁶

STATES	NUMBER OF SAUs	STATES	NUMBER OF SAUs
Andhra Pradesh	1	Kerala	1
Assam	1	Maharashtra (including CIFE)	5
Bihar	2	NEH Region (Central University)	1
Delhi (IARI)	1	Orissa	1
Gujarat	1	Punjab	1
Haryana	2	Rajasthan	1
Himachal Pradesh	2	Tamil Nadu	2
Jammu & Kashmir	1	Uttar Pradesh	4
Karnataka	2	West Bengal	2

⁵ Data extracted from *Annual Report 1997-98*. Department of Agricultural Research and Education, Ministry of Agriculture, New Delhi, 1998.

⁶ Mandates of the ICAR and its Research Institutes. New Delhi: ICAR, 1994, P166.

The National Agricultural Research System of India⁷⁻¹⁷ has necessary infrastructure and is well equipped with laboratories, libraries, and manpower. It also has the largest scientific manpower. It is estimated that the country today has over 60,000 scientists under various government and non-governmental organizations engaged in active research, excluding technical, administrative and supporting personnel. The scientific manpower –management personnel, scientists and teachers engaged in research, education & extension work in agricultural sector –has been estimated to about 31,000.

8. Future of Indian Agricultural Libraries

In spite of some dark spots in the history of past 50 years of Indian agricultural libraries for different reasons, now they have sunny days and a bright future. The present trends of economic globalization have made agricultural globalization imminent and the second Green Revolution will be an event of near future. The agricultural libraries and information centres cannot be ignored and they will have to play a vital role in the service of the nation. It is emphasized again that ICAR, New Delhi planned to develop a nation-wide agricultural information network connecting all libraries of State Agricultural Universities and ICAR research institutes and it is being developed to all states of India. The ARIS cells will have connectivity with libraries also for bibliographic information. Thus Indian agricultural libraries with electronic platform will join information super highway –

⁷ Radhawa, M.S. A History of Agriculture

⁸ Swaminathan, M.S. Report of the Working Group on Agricultural Research and Education for the Formulation of the Eighth Plan. New Delhi: Planning Commission; ICAR, 1989.

⁹ Sidhu, D.K., Tyagi, K.C., and Mishra, S.P. Content and coverage of Agriculture and Dairy News in regional and National Dailies, *Interaction*, 1983, 1, p77-90

¹⁰ Bhatt, V. S. Information Resources in Agricultural Research, In 40 years of Agricultural Research in India. ICAR, New Delhi, 1989. p.272-82.

¹¹ Swaminathan, M. S. Report of the working Group on Agricultural Research and Education for the Formulation of the Eighth Plan. Planning Commission, ICAR, New Delhi, 1989.

¹² Sharma, R.D. The Agricultural Information Network for India, Society for Information Science, PID Building, New Delhi, 1989.

¹³ Ostman, Ronald E (Ed). Communication in Indian Agriculture. New Delhi: Saga Publications India Pvt Ltd, 1989.

¹⁴ Final Report of the ICAR Institutes and Agricultural Universities (Indo-American Agricultural Library Survey & Study Team for the ICAR), ICAR, New Delhi, 1968, 182p.

¹⁵ Swaminathan, M.S. The Great revolution and small farm agriculture: Annual Report, CIMMYT, Mexico, 1990.

¹⁶ Prasher, R.G. Managing University Libraries. New Delhi: Today & Tomorrow's Printers & Publishers, 1991, p350.

¹⁷ Final Report of the ICAR Institutes and Agricultural Universities (Indo-American Agricultural Library Survey & Study Team for the ICAR), ICAR, New Delhi, 1968, 182p.

The Electronic Libraries, The Digital Libraries at local, regional, and national levels and enter with pride and smile into the Knowledge Age of 21st Century.

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