CHAPTER - II

REVIEW OF LITERATURE
2.0. INTRODUCTION

Library is essentially a service-oriented institution. The Primary objective of the library is to render satisfactory and timely services to the user community. One of the most important developments of research in the library and information field in 20th century has been the growing emphasis on the user. This trend shows that focus today is not on the mere system, but on its response to the needs of the users. The libraries have changed the out model concept of preserving a large number of reading materials for the sake of preservation only. In this context, it is note worthy to quote Gurudeva Tagore’s Remark. “The extent of use to which the reading material of a library is put, should determine its importance rather than the staggering number of volumes”.

The past trend of book oriented concept has been changed into user oriented concept. This is the era of user or clientele. User is one of the most important component of information system which is concerned to satisfy the information needs of the user. Since user satisfaction and his needs are complex in nature and it will be very difficult to know the exact needs of users. However, number of studies were conducted to know the exact needs of the readers. The user studies and to know about the user is a continuous effort and process in the field of information science. This is due to complex nature and dynamic quality of the users.

A comprehensive review of literature has become an essential part of any investigation as it identifies the problems and gaps in the area of research and also provides a basis for theoretical framework of the study and interpretation of the findings. In this chapter, an attempt is made to review briefly the available literature
on the information facility for agricultural education, research and extension in general, and in India in particular.

This chapter reviewed literature on Agricultural Education, Research and Extension, Agricultural Libraries Management, Services, Online services, Information systems, Networks etc.

2.1. USER STUDIES

Phadnis and Shoiab (1977)\(^1\) outline the present work of Indian agricultural scientists, and their need for published and non-published information. They describe the complexities of some secondary source publications and the problems of information retrieval there form. Suggests the user of computer for providing better services to scientists stresses the need for user training programmes in agricultural libraries.

Ramanna and Gopinath (1982)\(^2\) explained the emphasis given assessing user need by NICFOS before planning and implementing systems and services. NICFOS has always tended to abide by the concept of user orientation for which information is collected by various methods like observation, contact and questionnaire. Besides, a feedback system also has been in corporate to assess the effectiveness of the services and to alter or improve the services.

Deshmukh (1983)\(^3\) reports the results of a user survey counted to evaluate the library resources of the Central Soil and Water Conservation Research and Training
Institute, Dehra Dun, through a questionnaire. The data has been analyzed and the results are presented in this paper. Such surveys can be helpful in future developments of the library.

Kotei (1983) expressed the opinion that it is hard to make distinction between the special, as opposed to general training programmes. Factors that can be considered special are the specific purposes of trend, e.g. pest control and the geography of the area. There is another sense in which special can be defined, namely the different categories of the users of agricultural information to whom user training is offered, special training should be coordinated with other specialists, programme outline should relate to normal agriculture operations and methods, innovative methods should be adopted, consistent with the complex, unique, ecosystem and other environmental conditions. Training programmes and policies should take cognizance of appropriate technology equipment, rather than non-operational ones, in that particular area. Modifications should be made between simple traditional modes of operation and scientific modes. Traditional methods should be introduced. More recent operations research findings should be studied before practical lessons being offered. Role and function of national and international organizations concerned with agricultural production, both trainer and trainee should understand finance, research, marketing, distribution, education and training together with other “non-productive” promotional activities. Agricultural information programmes must lead to results that can be assessed quantitatively and qualitatively. Educational programmes and packages should be designed specially for each of the following categories: researchers, administrators, students and teachers, extension officers, writers and editors non-literate traditional formers. Each of these has their own peculiar problems
of communication with library/information centers on the one hand, and with large scale and small-scale agricultural workers on the other.

Maheswarappa and Trivedi (1986) surveyed the information needs of food scientists and evaluate the services provided to them at CFTRI, Mysore. Results of the study are expected to be of help to those involved in planning and execution of effective information services with field of food science and technology.

Aina (1988) reports the findings of the survey of the agricultural information needs of farmers in six villages in Nigeria. The important aspects of agricultural information they required and how these requirements are met are explored to make suggestions. It was suggested that libraries should be established in rural areas so as to meet the specific needs of farmers.

Malhotra (1990) studied the relationship between the adequacy of library collections and the amount of daily library use by postgraduate students. Results did not support the hypothesis, that the use of library is directly proportional to the relevance of the library resources to the contemporary needs of the student community.

Sengupta (1990) describes the effects of the information revolution brought about by development of computer and ancillary techniques and equipment for the modification and processing of stored information places the information scientists in an agricultural institute.
Andre (1991) explains the objectives of the National Agricultural Text Digitizing Project. The purpose of this project was to tend the feasibility, cost and effectiveness of newly emerging technologies for capturing page images, providing access to their content and disseminating them via CD-ROM. A variety of issues have been raised regarding the effectiveness of these technologies for developing and disseminating full text databases including the need for a basic low-cost retrieval work station, standards for image material, a standard user interface and the capability to provide long-term archival storage for electronic media. These issues are discussed from the end users viewpoint.

Livingston and Narasimha Raju (1991) studied through a questionnaire, the nature of information requirement, opinion on library services and collection and assessed the need for a union catalogue of Andhra Pradesh Agricultural University. Circulation of reprints, organization of SDI information service and the implementation of latest information technology into the libraries/information centers are recommended.

Deshmukh and Deshpande (1991) opined that the object of the library is effective communication of information to the students, teachers and scientists. For this, the libraries have adopted various information technology techniques for developing bibliographic database and for retrieval of information. In order to make best use of libraries by the clientele, it is necessary to acquaint them with these techniques by the use of User Education Programme and Reader Instruction Programme.
Frierson and Panline (1991)\textsuperscript{12} reported about a major market study which was conducted by the CGIAR secretariat and Digital publications to assess the information needs in agriculture in the developing and developed countries and to relate these needs to the potential for CD-ROM products. The survey covered twelve hundred libraries and research centers worldwide.

Pozdnjakov (1991)\textsuperscript{13} studied the features and functioning of USSR agro-industrial complex. The data obtained was used to improve the libraries acquisition policy, to optimize its collections that will allow us to satisfy the information requests of agricultural scientists and specialists in a more complete and a prompt way. This study allows the creation of an optimal model of collections in a scientific agricultural library.

Livingston and Narasimha Raju (1992)\textsuperscript{14} explained the importance of agricultural information and its needs to agricultural researchers outlined. The nature of agricultural information required, research facilities and the library and information services available to agricultural researchers in Guntur district of Andhra Pradesh described. Based on the results, a set of conclusions was drawn to enhance the library and information services for the region.

Kaur (1993)\textsuperscript{15} studies the relationship of academic achievement of the postgraduate students (regarded as the independent variable) and the quantum of dairy library use (regarded as the dependent variable). Two independent samples of postgraduate students, one each from Haryana Agricultural University, Hisar and Punjab Agricultural University, Ludhiana was taken. The Spearman’s Rank Correlation
coefficient was calculated for the two different sample groups and their results compared.

Sanjeev (1994)\textsuperscript{16} analyzes the topics of theses available in the College of Agriculture library, Vellayani using the schedule for Agriculture in Colon Classification. The details about different facts occurring in the topics of the theses and the context in which they occur were studied. Using the "bond theory" formulated by Dr. S.R. Ranganathan, the nature of specialization in agriculture, the bond connecting the main class and other isolates were examined.

Darko (1995)\textsuperscript{17} presents results of a survey of the information needs of research scientists at the Cocoa Research Institute of Ghana and the Cocoa Research Institute at Nigeria, along with the library facilities available to them. He expressed the hope that the respective libraries will use the surveys to improve their services to the research scientists.

Ozowa (1995)\textsuperscript{18} deals with the identification of the nature of small scale farming agricultural input and diffusion of Agricultural Information Technology through extension education. Explores marketing of information needs of farmers and analyses the medium of information dissemination in use. He points out the limiting factors and constraints in agricultural information dissemination in Nigeria and suggests satisfying the needs of farmers with emphasis on traditional media.

Beraho, Sheahan and Reeves (1996)\textsuperscript{19} discuss the aspects of the rural extension from the perspective of experience gained in Uganda between 1989 and

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1992, insight into the operation of land care groups in Australia 1993, as well as observations and survey recently carried out in the Mukono district during 1994. The paper highlights strengths and weaknesses in the current extension system based on the Training and visit (T&V) model, points out challenges an extension agency has to face in rural change, do best in enhancing communication, and utilization of agricultural information in rural places. It also discusses the need for developing and strengthening grassroots’ institutions, in order to develop a local capacity to sustain development and break the dependency syndrome is highlighted.

Bay-Petersen (1996) discussed about marketing for small-scale farms in Asia and traces out the problems in providing regular timely and relevant information to geographically remote users. What farmers in remote areas need is information about the local centers is by low-cost methods such as display boards in villages. The paper discusses current programmes of this kind in several Asian countries including Indonesia, Taiwan and Japan.

Beavers, Russell and Sibia (1996) provided a systematic review of research studies related to the delivery of information services to agricultural scientists working at remote laboratories in fields. The paper concludes with the discussion of strategies for improving access to information for scientists at remote locations, and with suggestions for future research on this topic.

Veeranjaneyelu (1997) reported the findings of the survey the farmers in his paper. He has suggested the organization of different awareness programmes and establishment of rural agricultural information centers in the state of Andhra Pradesh.
Neena (2006) discusses LIS course content followed by 17 universities of agricultural sciences in the country. She analysed the suitability of these courses in achieving the objectives laid down and evaluates the course content in changing context and the need for restructuring the course curricula in present context. She also suggested a separate one credit course on LIS user education and a separate course on technical writing.

Ramesh (2009) discussed the networks of agriculture information under the Agriculture Ministry, Department of Agriculture, Directorates, Universities and the farming community and analyzed technological interventions in farming community era.

2.3. INFORMATION NEEDS AND USE PATTERN

Somasekhar (1980) opined that the cooperation will be of much importance to the agricultural libraries in our country because the agricultural universities have been and are being established with the main intension of improving agricultural technology, and thereby, agricultural production. He suggested that setting up of National Agricultural Library (NAL) as a central body for chalking out the details is the need of the hour. This central body can coordinate between the cooperating agencies and suggests organizational pattern and policy for agricultural university to prompt this activity.
Eswar Reddy (1982) has conducted a study for the assessment of a range of library and information services offered for agricultural extension officers. His study confirmed that the agricultural extension officers require effective library and information services as his respondents had been using the libraries available to them frequently. Further, he outlined the basic information requirements of agricultural extension officers as: (i) traditional information used in education and training it covers, for example, basic agricultural knowledge, agricultural practices, farm skills etc. (ii) innovative information resulting generally in research and development works (iii) timely information required at a particular time for a specific purpose. It is the question-answer or problem solving type of information. It is further established from the study that the agricultural extension officers would like to have free photo copying service followed by bibliographical information and study of information and specific problems. It is evident from this study that the extension works also require bibliographic information apart from processed information and data.

Fisher and Kinch (1990) stressed the need for reference service in the agricultural libraries. Reference service provides the mechanism by which the user of agricultural information can interface with the larger body of knowledge to secure what is desired. Technological advancements have greatly improved the accessibility of the broad range of information relevant for the achievement of successful reference.

Aina (1991) discussed about the agricultural information needs of extension officers in Africa. The needs are identified as control of major pests, credit and cooperatives, proper handling of wise articles, marketing of agricultural products, etc.
The information needs of farmers were identified to be in areas of the supply of fertilizers, pest and disease control, planting materials and credits and loans. To obtain information specialists in training and education should be re-oriented to include courses on agricultural sciences, rural sociology, adult education, and computer sciences.

Hemasundar Naidu and Gunjal (1993) emphasized the role of library building in rendering effective service. The study reveals that nearly 40% of agricultural libraries studied possessed independent buildings. It works out the area utilized various library functions. The paper stressed that quite a large number of agricultural libraries need additional floor area to meet its immediate and future requirements. It also suggested that library housed in non-functional buildings should plan for new library buildings on functional lines.

Russell (1997) explained with evidence from the literature that indicates the various ways of use of information in Agriculture and Scientific research. Coverage includes the contributions information makes in creativity, technology transfer, the diffusion of innovation, paradigm shifts, regular revisions of national guidelines on nutrition and other subjects, and in solving national and regional cries relating to agriculture and food safety. In addition, reference is made to the value of information in reducing duplication of effort and in helping scientists redirect their research into new areas.

Aswath, L. (1998) traces the development of agricultural education in the Indian state of Karnataka, and funding of University of Agricultural Sciences Library.
It describes the planning and various aspects of new building, which was opened in 1976, and critically evaluates how space is utilized as different functional points.

Kannappanavar and Praveen (2005)\textsuperscript{32} in their paper described different training programmes for the library professionals in India. It contained the results of questionnaire survey of the library professionals working in selected Agricultural Science University Libraries in India on different Training Programmes in India. It also attempted to assess the satisfaction of the library professionals about the training programmes.

Sujatha and Mahesh (2008)\textsuperscript{33} examined the use of electronic information sources by the teachers/scientists, research scholars and postgraduate students in the College of Fisheries, Mangalore. Suggestions have been given to strengthen the existing electronic information sources and services and to maximize the use of electronic information sources.

Biradar, Dharani and Mahesh (2009)\textsuperscript{34} has conducted a survey in Agricultural Science College, Shimoga to study the frequency, purpose of visit to the library and the usefulness and concludes that emphasis needs to be given for subscribing online periodicals though e-consortia.

Meitie and Purnima Devi (2009)\textsuperscript{35} attempts to find out the information needs of the persons engaged in the agricultural activities particularly farmers community in the rural areas of Manipur. The paper highlights the channels of getting information by rural farmers’ community in order to fulfill their information needs.
2.4. INFORMATION SEEKING BEHAVIOUR

Landon-Lane (1996)\textsuperscript{36} observed that in an agricultural extension project, at a number of locations in Sumatra, Indonesia, a participatory approach was taken to the analysis of individual farming systems and to the process of formulating agricultural advice. Agricultural information professionals include librarians, documentalists, information scientists etc., and perform the jobs in a way that is very similar that of agricultural extension workers. Agricultural Information Professionals work in a variety of institutions, either as ‘one-man-bands’ or with dozens of colleagues, with various levels of subject specialization in centers dealing with one commodity only or embracing most aspects of sophisticated systems and technologies, according to the level of development reached by their country, region or institution.

Siva Prasad and Gaddigamath (1996)\textsuperscript{37} described user education programme organized for Agricultural scientists of NAARM. They stated the meaning, objective, course content, faculty resource persons, teaching methodology, evaluation, and future plans of user education programmes.

Ramarao, Muralidhar and Kalla (1997)\textsuperscript{38} presented brief profile of scientific staff in the State Agricultural Universities (SAU) in India. The data collected through a survey sketches the scientific staff background, age, gender, education, mobility, career details and time spent on various activities.

Kaur (1998)\textsuperscript{39} discussed about the requisite knowledge and skills for the agricultural information professionals and suggests for reorienting the existing syllabi
of library and information science schools to train agricultural information professionals for the changing role of libraries an information centers.

Singh and Satija (2007) in their paper highlighted the information seeking behaviour of agricultural scientists working in the ICAR institutions of Delhi and Punjab Agricultural University, Ludhiana and for accessing information, agriculture scientists highly depend on the library collection, followed by the personal collection, collection of their supervisor and their colleagues.

2.5. AGRICULTURAL INFORMATION SOURCE AND COLLECTION DEVELOPMENT

Guha Roy (1940) traced out the growth and history of research in agriculture. He mentioned about some old and classic books on Agriculture. Further, he suggests preparing a union catalogue of scientific periodicals and books available in India and the cooperation among the libraries in India.

Singhvi (1964) presented in his paper the findings of a field study of Division of Bibliography of United States Department of Agricultural Library. It describes the development of bibliographic work and coming into existence as ‘Bibliography of Agriculture’. The ‘Biological Abstracts’ is fully analyzed with respect to its subject matter, coverage and scope, arrangement and overlap pings. Lastly, it concludes with its usefulness and drawbacks and with a suggestion for reviewing again the subject index for each issue brought out and for providing the cumulative indexes.
Blanchard (1967) traced the concepts of agriculture, Agricultural Information availability in the library of the Food and Agriculture Organization of the U.N in Tome, National Agricultural Library, Central Scientific Agricultural Library, Moscow. The paper describes sources of Agricultural Information and different branches of Agriculture i.e. Botany, Horticulture and Agronomy, Plant Breeding, Plant Pathology, Animal Sciences, Physical sciences related to agriculture, food and nutrition, Agricultural economics and Rural Sociology.

Brennen (1974) conducted a survey of 51 cooperating libraries located at land grant universities and the National Agricultural Library to evaluate the periodical collections on tropical and sub-tropical agriculture. The six-month study showed wide ranges in coverage of serial literature in the subject field among the cooperating libraries. The results of the study present a strong case in favour of the division of subject fields among libraries within regional areas in the United States.

Phadnis and Sital (1974) presented the results of a general survey of literature in the field of Agriculture. The coverage of secondary periodicals, the organization having important collections a complete picture of Agricultural research in India and an account of the information facilities available to an agricultural scientist in India were presented and assessed. Suggestions for new services in the future were also made.

John (1978) described the objectives and activities of Commonwealth Agricultural Bureaux. The Commonwealth Agricultural Bureaux was founded to meet
the need among commonwealth countries for a world agricultural information service. The structure and development of the organization was discussed, as are the journals.

Goyal (1979)\textsuperscript{47} pointed out the need for theses and abstracts in the field of agriculture and allied subjects in India which resulted in a quarterly Thesis-Abstracts published by the Haryana Agricultural University, Hisar. He examined the coverage of Theses-Abstracts and depicts the subject-wise trends in the disciplines covered. He also suggested the improvements for better coverage and prompt service of Thesis-Abstracts to scientists.

Vashishth (1979)\textsuperscript{48} highlighted the role played by UNISIST and various other world bodies and commercial concerns in providing technical help and guidelines for the creation and maintenance of necessary infrastructure to handle the information effectively. Discussed in detail the organizational and operational aspect of INIS and AGRIS and their products. Mentions the procedure and mode of communicating input data by India. Made a case for online availability of information to the Indian scientists.

Kumar and Dutta (1982)\textsuperscript{49} evaluated the SDI service of ICRISAT. They observed that it was restricted to 5 crop improvement programmes. ICRISAT's mandate also includes farming systems and social economics. A thesaurus was developed and the information collected will be computerized in future in order to provide a more pinpointed SDI service to a wider range of clientele. However the feedback received indicated that the system has been successful.
Metcalfe and Cooper (1982) critically examined the reasons behind the CAB's policy regarding non-conventional literature. CAB is a business operation, and meeting user needs is the key to its survival. Efficient use of staff expertise, development in computer technology, reducing overheads and improving marketing by CAB were helping to reduce costs. The options for handling non-conventional literature are outlined: CAB favors each country handling its own and only imputing to AGRIS and CAB a selected, internationally relevant subset. The inclusion of extension literature in AGRIS would not be cost effective.

Subbaiah (1982) outlined Indian agro-biological literature and stresses the necessity for making this literature available at one place. Important International and Indian documentation agencies are described. An attempt made at the Marthwada Agricultural University Library, Parbhani (Maharashtra) towards the biological control of Indo agro-biological literature is explained. A bibliographic research cell was set up at this library in collaboration with the scientists and the library's professional staff prepared an information file and also published 7 documentation projects on various aspects of agriculture.

Lal (1988) made an attempt to identify the most important source of citation, its geographical and chronological distribution in the field of agronomic research in Bihar. The most important journals identified through the technique of citation analysis as indicated by their frequency of citation were Indian Journal of Agronomy, Indian Journal of Agricultural Science, Indian farming, Fertilizer News, Agronomy Journal, Madras Agricultural Journal, Field Crop abstract and Plant and Soil. Among the cited journals India occupied the first rank as a country of publication followed by
USA and UK. The chronological distribution of citation to journals suggest that the researchers in agricultural cite from current journals and seldom refer to back number.

Lal (1989) made an attempt to identify the main sources of citations and prepared a list of the most important journals in various branches of agricultural science. In addition to it, a list of 59 most cited primary journals in order of their merit has been prepared. The geographical and chronological scattering of citations have also been included. The information inferred in the paper may be of help to agricultural university libraries to arrive at a need-based consideration in the selection and acquisition of journals within the limited resources.

Rajasekharan (1989) attempted to work out the seniority based promotion which still continues to be in vogue in many academic libraries in India, and states that is detrimental to profession and library development as a whole. Here, an attempt was made to work out the details of a meaningful selection procedure for the position of librarian in an Agricultural College, duly emphasizing the advantages of merit-based promotion system. Its implication on the professional status, the educational qualification and qualities required for the aspirant, a proposal for selection test etc, were delineated. Finally, the paper concludes with the fixation of a rational criterion for selection of librarian in Agricultural education and consequent Agricultural development of our country.

Jones (1990) reviewed the concept of agriculture today which embraces not only the traditional areas of food and fibre production, but also an increasingly broad spectrum of related subjects and concerns, which have become important to this
evolving field. This article will provide an overview of the types of agricultural information, the formats now being utilized for its storage and distribution, the organizations which play a role in its creation and dissemination and finally where it may be found or how it may be accessed.

Kabir (1990) reported the use of citation analysis to determine how information is transmitted in formal information communication by use of citation data generated from a study of Indian agricultural scientific periodicals, involving citation frequency, impact factor and discipline influence score.

Pichappan (1990) reported the use of citation analysis to determine how information is transmitted in formal information communication by use of citation data generated from a study of Indian agricultural scientific periodicals, involving citation frequency, impact factor and discipline influence score.

Thomas (1990) opined that bibliographic control of agricultural publications is a complex and costly process. There is also no single source in which to locate all citations to particular topic in agriculture. AGRICOLA, AGRIS and CAB Abstracts are there major databases that provide journal article-level analysis of agricultural topics, the overlap in relationships among these databases and their unique features are described. Pointed out that new technologies have also brought significant gains in the area of bibliographic control and developments in automated indexing could make the process of providing bibliographic access and control more productive in the future.
Manjunatha (1991) identified the key concepts in literature published in Agricultural Sciences. Varieties of information resources, variations in the subjects, conventional, primary, secondary and tertiary literatures are identified are described. Computer-based bibliographic services were analyzed.

Raju (1991) described in detail, about the three major abstracting services - Rural Development Abstracts, International Development Abstracts of the UK and Abstracts of Rural Development in the Tropics of the Netherlands to examine their scope, coverage, pattern of citation and indexing together with the services offered. This paper suggested that the publishers of these abstracting services make an effort to augment the coverage for better bibliographic control of gray literature. This can be done in cooperation with regional organizations and international donor agencies.

Thomas (1991) discussed a detailed, comprehensive, multilingual agricultural thesaurus which would provide enhanced access to indexed agricultural literature. Out of this discussion has come a proposal for a feasibility study which would suggest effective solutions to the international problem of thesaurus based access information.

Olsen and Kennedy-Olsen (1991) described the efforts made by Mann library at Cornell University to develop electronic collections. The Mann library at Cornell University has received a $550,000 grant from the Rockefeller Foundation to identify the core literature of the agricultural sciences appropriate for education and research in Third World countries. The literature identified through this project will be put in full text on to compact disks and made available as core libraries. The core
literature will be determined by citation analysis and other bibliometric techniques, including review by scholars in eight subject disciplines. The lists will be published in eight volumes: Agricultural Economics and Rural Sociology, Agricultural engineering, Plant Sciences-Basic, Plant Sciences-Applied, Animal Science, Economic Entomology, Forestry and Silviculture and Soil Sciences. Details of the programs, purposes and schedule, subject areas to be included and progress on the compact disk (CD) effort were provided. The bibliometric methods used in determining the core literature in each of the eight subject categories are outlined. The methods for choosing reviewers, determining balance in the lists weighting of reviewer’s decisions and threshold levels for removal of titles are covered. The project includes the selection of core literature not only for the Third World, but also for the developed world, and the relationship between these two points-of-view is noted.

Hemasundar Naidu and Cunjal (1992) reported the findings of a comparative study of collections by the division of Agricultural libraries in India into three categories. They mentioned that books and periodicals procured by these libraries have been considered as the core collection and the collection tendencies are studied on the basis of the activities of parent institution. They observed that books and periodicals available in the National Research Institute Libraries were found to be very high when compared to other categories.

Hemasundar Naidu and Cunjal (1992) stressed the importance of inter-library loan service. Inter-library loan relations of the agricultural libraries were
studied. The type and number of documents borrowed and lent is discussed including the response. Certain steps for effective inter-library loans are suggested.

Livingston and Narasimha Raju’s (1992)\textsuperscript{45} reported the results of a survey of the library and information resources and services for agriculture in the district of Guntur in Andhra Pradesh of India. They pointed out the inadequacies of library facilities, proposes effective utilization of information resources through library cooperation and networking to support research and education in agriculture.

Suryanarayana and Raman (1992)\textsuperscript{46} discussed in detail, the objectives and activities of the library and documentation services at Central Tobacco Research Institute, Rajahmundry. Some of the areas such as collection development, documentation and various information services, computerization activities, sharing of resources of other institute libraries and institute’s research publication and distribution were discussed.

Garg (1992)\textsuperscript{47} analyzed the papers published by Indian agricultural scientists in Indian and non-Indian journals to find the areas of agricultural research, institutions involved in agricultural research and the papers published by them.

Lal (1993)\textsuperscript{48} defined the purpose of a book bank in a University/ college library; narrated the operation of this scheme at Rajendra Agricultural University, Pusa, its rules, year-wise growth in collection, the expenditure incurred and the services rendered; offers suggestions for its further development.
Bharati and Stanley (1993) advocated that scientific periodicals occupy most vital and important position for the quick and better communication as they report recent developments and trench out the publication trench in the field of agriculture by Indian authors.

Suryanarayana (1995) reported the results of bibliometric analysis of publications of CTRI and its Research Stations from 1949 to 1997. Analysis is done on the authorship pattern, yearly distribution of literature; publication pattern in broad disciplines at the main institute and at the stations before and after implementation of UGC scales to the scientists' publication in regional language periodicals and foreign language journals; concludes that there is reduction of publication of articles after UGC scales in foreign journals.

Besemer and Verman (1995) outline the ways in which information can be located on the internet, through the use of internet resource guides, subject trees in gopher, listings and subject trees on the world wide web, researchable indexes on the world wide web, Usenet postings and electronic mail discussion groups. They Described 3 case studies from the field of Agriculture in which information was sought on specific topics using these methods.

Singh and Mehla (1995) discussed about the issues involved in establishing a CD-ROM station which include assessment of users' requirements, selection of databases, network decisions, hardware selections, staff and user education and service policies. Products available on CD are described including CAB abstracts and AGRICOLA as well as Toxline. The paper includes a discussion of using CD-ROM
versus on-line databases on the paper products in providing information services as well as the cost effectiveness and the impact of space in a facility. The conclusions are that CD-ROM holds promise for developing countries and CD-ROM will remain the medium of choice for the publishing industry.

Sharma and Murthy (1995) emphasized need for the full use of the wealth of agricultural information generated in India, by processing it into consumer oriented and user friendly forms. They considered the steps required for this, including the diagnosis of user needs, information formats, collection and delivery agencies and management of training programmes, as well as the development of new research programmes to predict future information needs.

Clark (1996) provided an annotated listing of Internet resources for agriculture and agriculture related information including: government sites; library resources; databases; agricultural statistics; agricultural organizations; electronic journals and magazines; lists and news groups; weather; major guides to agricultural resources, clip art and agricultural image sites; and other interesting sites.

Peres and others (1996) described the objectives of their developing an index of citations in agricultural science (IBCC Ag) similar to Science Citation of Index (SCI) published by the Institute of Scientific Information. The IBCC Ag will be complementary to SCI the additional database is necessary due to the locational characteristics of the agricultural sciences especially in its applied part. Thomas (1996) assessed the coverage, of Indian agro biology journals in Biological Abstracts (BA), Agri index, current advances in Biological Sciences (CABS) and current
contents (CC) was done based on subject specialization, periodicity and multiple coverage.

*Srinivas and Venkateshan (1997)* described the growth and development of Semi-Arid Tropical Crops Information Services (SATCRIS), its objectives and its products and services. Their paper also describes the process through which SATCRIS services and products are promoted. It explains the change from manual system to an automated system of the SDI services and the process of getting feedback from the users for this service.

*Hemasundar Naidu (1998)* outlined the importance and the components of the agricultural literature. Stresses need for exchange of publications, Discusses exchange relations among the agricultural libraries in India and the type of documents exchanged.

*Sharma (1998)* described about the modern agricultural journalism which was born in India with the advent of printing when three books on modern methods wee got translated by Sir Syed Ahamd Khan. Now ICAR publishes four journals and two newsletters in English and three in Hindi. Overall, about 250 periodicals in India are devoted to agriculture. The paper also describes the Agricultural Research Information Centre (ARIC) at Indian Council of Agricultural Research Headquarters, India, the databases available, publications brought out and services rendered by the Centre.
Biradar (2000) studied the existing rural libraries in Karnataka and collected the opinion of farmers of the region. One thousand farmers were interviewed for determining the sources of information used in various stages of farming activities. Also suggested strategy to develop the collection of rural libraries and to make use of them.

Boraiyan's (2000) paper dealt with the concept of information. It delineated the nature of information sources, and draws the attention of consumer of information (user) towards the information (storage) systems and its services. It depicts the significance of information Agricultural Research and Development Institute. It illustrates the mode of linkages such as the current services and other dissemination of information services available for agricultural scientists.

Arunachalam, Subbaiah and Umamani (2001) presented an assessment of India's contribution to research in agriculture and related fields based on an analysis of publications indexed in CAB Abstracts published during 1990-1994. It attempts to map agricultural research, in which journals of Indian research works get published, in what sub-fields is India strong, and so on. It aims not only to inventory agricultural research in India but also to provide an appreciation of endogenous research capacity in this crucial field.

Stefka et al (2007) in their paper described some of the efforts that have been made in this area over recent years. The new AGRIS initiatives. Content management, the management of agricultural science and technology information has various needs.
Raman Nair (2007)\textsuperscript{43} opined that scientific planning for agricultural development to overcome backwardness is very important for India. Speedy and sustainable agricultural development is tied closely to effective planning which in turn rests heavily on information available for the process. Reveals that information resources available collectively are sufficient.

Rokade and Rajyalakshmi (2007)\textsuperscript{44} in the paper succinctly described the present status of infrastructure and collection development of the four agricultural university libraries in Maharashtra.

Rege et al (2009)\textsuperscript{45} This paper seeks to highlight the role of a key KAINet partner, the Kenya Agricultural Research Institute (KARI), in addressing information access and exchanges identified through a KAINet needs assessment and it also presents achievements and progress in the challenge areas, lessons learned and the evolving KARI national ‘intranet’ of 42 centres and sub-centres being interconnected as a major component of KAINet.

Shri Ram and Laxman Rao (2009)\textsuperscript{46} has described the range of information resources associated with the activities, application and products of bioinformatics. As the pace of research increased in agriculture with new technologies that ‘scale-up’ the experiments researchers have developed acute need for the information technology.
Shalini (2009) presented an article on the ICAR library and information centers in Maharashtra to study the various existing services rendered by the information centers under ICAR in Maharashtra and concluded by pointing out the network development plan needs to be evolved to bring together to share resources of ICAR and enhance flow of agricultural information.

Krishna and Parashuram (2009) in their paper presented the current status of reference services in 27 selected agricultural university libraries in India and the services found at library websites of the respective websites are reviewed.

Kebede and Poloko (2009) this paper explores Open Access and Institutional Repositories from practical perspectives. It describes the Botswana College of Agriculture Library’s IR as a case study, including lessons learned in establishing and running the IR.

2.6. AGRICULTURAL LIBRARY AND INFORMATION MANAGEMENT

Shrimali (1978) expressed the view that the agricultural library is a vital link between research and practice. To control the increasing amount of technical literature, the library must be well administered, well organized and well developed. The librarian should aim to acquire selectively, books and non-book materials on a wide range of agricultural related topics; provide a good service with both potential and actual in mind, and gain good knowledge of agriculture, related to sciences and languages. They should have the same status and pay scales as the teachers and researchers in the agricultural universities.
Ranganath, et al. (1981) analyzed and examined information published in the area of Food Science and Technology from India. The experience gained in sending the Indian input to international food information service has also been analyzed and the usefulness of such collaboration has been delineated. This analysis also pointed out the areas of most active research in food field based on the information available in published articles.

Martinelli (1983) in his article summed-up remarks at the International Conference on Education and Training for Agricultural Library and Information work held in Nairobi from 7th to 12th March 1983. The paper surveys all the subjects discussed at the conference. A profile of the agricultural information, professional and their educational requirements are identified. Currently available education and training programmes in agricultural information work are described and discussed. Proposals for future action reflecting the views of conference and participants are discussed.

Rajasekharan (1984) described the situation regarding Kerala Agricultural University Library system, mentioning collection, technical processing, finance and kinds of users served, purposes a structure of Library system contributing network of libraries at three levels with central Library at the apex-suggests the services, staff and teaching processing to be provided by such a network.

Oviss Oruma (1984) discussed in his article about three basic problems that contribute to the existing complexities in Agricultural Information. One problem is
the two levels of operation in agriculture: there exist at present a dichotomy in agriculture largely due to governmental participation in institutionalized agricultural research while traditional agricultural practices remain largely unsubsidized. Another problem is the imprecision of the "Agriculture". Agriculture has grown so broad that at now include every remotely related area in addition to what is traditionally known as agriculture. As a result of this the term "Agricultural literature" has acquired an indefinite and imprecise meaning, which creates another problem.

Thorpe (1985)\textsuperscript{95} observed that weak information management is a feature of agricultural research systems in the developed world. Problems identified include lack of coordination, deficiency in communication or research findings, lack of linkages with various other institutions at national and international level and so on. He suggests for improving the situation, emphasizing the high priority, which must be attached to the bibliographic control of the grey literature, produced within the country itself.

Deshpande and Deshmukh (1985)\textsuperscript{96} mentioned the significance of agricultural libraries and their treatment as special libraries. Refers to the number of indexing and bibliographic services in the field of agriculture giving their details. Suggested the coordination of existing indexing and abstracting services and the need for special training in agricultural documentation.

Joshi (1985)\textsuperscript{97} analyzed the citations taken from research articles sent to various journals by the staff of the Central Plantation Crops Research Institute during 1983 and 1984. A total 1,114 papers yielded 990 references. The analysis covered
different forms of cited documents and cited journals and their frequencies. The citation data matched the library’s journal subscription list. This matching showed that 40% of the subscribed journals were not cited and 50% of the cited journals were not subscribed to. Journals accounted for 70% of the citations. Out of the 213 journals cited, 6.6% earned 38% of the citations. Matching of staff-strength in various subject disciplines with journal subscription showed that Animal Sciences and Engineering ranked second and third respectively in the number of journals being subscribed to in these disciplines those formed only 1.7 and 3.1% of the total staff-strength. It suggested that the library’s subscription policy should take into account these two criteria, i.e., journal use as shown by citations and relative manpower in different subjects.

Hemasundar Naidu and Gunjal (1985) discussed the importance of newspaper clippings in agricultural information, and stress the need for newspaper clipping service. Described various problems connected with the organization of newspaper clippings to storage and retrieval of these clippings in agricultural libraries. The paper traces out newspaper clipping and indexing service provided by agricultural libraries and emphasizes the need to make effective use of their vast information resource. It suggests more newspaper clipping unit’s specialized areas in agriculture for wider coverage.

Rajasekharan (1986) stated that the subject agriculture is covered with numerous abstracting and indexing services encompassing all interrelated specific subjects. Studies show that agriculture is not confined to journals exclusively dealing
with agriculture alone. He opined that online services offer efficiency in dissemination of agricultural information with more speed and accuracy.

**Mangla (1988)** traced the development in the field of agriculture, particularly after the country achieved the Independence. He also examined the developments in the field of agricultural education and establishment of various universities and institutions. Suggestions were given in areas such as: financial resources; National information System in Agricultural services; Declaration of IARI library as National Agricultural Library; Application of computer in library operations and services.

**Gregorio and Sison (1989)** stated that much progress has been made in the past two decades in agricultural information provision in Southeast Asia. There is now a need to draw finer distinctions when referring to the problems of information transfer in the region. Urban users are now relatively well served, but their rural counterparts at the village/farmer level remain neglected. The use of new information technologies ought to be marshaled for use in developing countries, through these have to be worked into programs using natural development strategies and approaches which have proven to be successful.

**Hemasundar Naidu and Gunjal (1989)** reviewed the importance of Agricultural library and information services in India. The growth and development of agricultural university libraries were explained. The existing library and information services for agriculture in India were examined.
Hemusundar Naidu and Gunjal (1989) surveyed all the agricultural university libraries and ICAR institute libraries following the DDC for classification of documents and adopting the second edition of AACR for cataloguing the documents. The author suggested that acquired documents should endeavor to complete the necessary formalities and make the documents available to the users, for avoiding the backlog of technical processing work should immediately update the same using the DDC 20th edition and AACR-II.

Boraiyan (1992) defined the agricultural librarianship, describes the goals and objectives, and organizational responsibility of agricultural libraries; states the ethical relation with the users, administrators and suppliers of information; and sketches the pressure for more services and the application of computers and communications in its activities.

Hauzner and Janoves (1992) described the services provided including access to a wide range of information sources such as special journals, daily newspapers, literature searchers carried out on the PolTox III and AGRIS databases on CD-ROM and SDIs which can be set up on current contents. Results of searchers are presented either in printed format or on disks. The audiovisual section produces educational and promotional video programmes while the graphics section is responsible for the production of exhibitions, maps and diplomas.

Prasher (1993) describes the importance of agricultural information facility in India for effective research and transfer of technology to the farmers. The library must become a partner in agricultural production not meant only for the scientists but
for the farmers also through rural library services. For this, the government should support the libraries with liberal grants enactment of library legislation and formulating a national policy on information.

Singh and Singh (1993)\(^{107}\) presented the state of art report on Agricultural college libraries in the Bihar state in terms of collection, usage, finance, staff, services, etc. whereas Stanely (1993) emphasized the importance of Agricultural Libraries and traced the history of the endeavors to establish a National Agricultural Library in India.

Bankapur and Kumbar (1993)\(^{108}\) opined that the management of technology transfers; research and development policy studies and planning require qualitative and quantitative data to ensure perfect productivity in any discipline. The data originated by the scientists was scattered in different sources and a thorough investigation of such data and its impact could easily be determined by using 'Bibliometrics' and 'Scientiometrics' tools for measuring the productivity in any discipline. This will help the policy-makers to make suitable decisions. Such tools and sources have been discussed; Agricultural Research has been taken a theme study.

Lal (1994)\(^{109}\) discussed the concept of staffing and its role in agricultural library. He traced the history of RAU library and its staff position since the day of its inception. His paper compares the staff with eight leading agricultural universities in India. It also studies the present strength in the light of UGC/ICAR staff formula. And it proposes the minimum required staff for an agricultural university library.
Boraiyan (1995)\textsuperscript{110} dealt with the management functions in an Agricultural University Library depicts the factors influencing the decision-making of the Library. He stated various personal, administrative, organizational and managerial abilities with librarian like a manager in a larger service/organization.

Lal and Singh (1995)\textsuperscript{111} traced the history and development of agricultural universities in India and discussed the importance of the libraries of these institutions in acquiring and communicating information to scientists. Their paper described the different aspects of the Nehru Library at Haryana Agricultural University.

Goldberg (1996)\textsuperscript{112} discussed in his paper the findings based on the analysis of international databases which shows inadequate coverage of the diverse information sources on natural resource management. Furthermore, these databases are not readily available to regional researchers, extensionists, producers, policymakers and information personnel. There are languages, financial and training barriers that limit or prohibit access. It presents a project that challenges information providers, producers and intermediaries in six Latin American countries to work in partnership to ensure recovery of and access to key sources through a range of communication channels.

Gachie (1996)\textsuperscript{113} described a survey carried out by BPDA-SCETAGRI, a French consulting company, and its Russian partner, covering private and collective agricultural producers within 3 Russian regions. It was found that producing that disseminating extension documents is needed because there is a shortage of this type
of document in the various CIS republics. This survey also showed that the procedures prefer both printed media and direct contact with the information provider. The experience, both in Central Europe and in Western Europe, indicates the need to setup new information/training services that would be accessible and useful to the Russian and Ukrainian agricultural producers.

Niang (1996)\textsuperscript{114} in his paper reviewed the developmental settings of the African, Caribbean and Pacific (ACP) countries and the challenge of agricultural information as well as the role of the Technical Centre for Agricultural and Rural cooperation (CYA) in facilitating the availability and accessibility of information to support agricultural development in the ACP countries.

Damodaran and Sambashiva Rao (1998)\textsuperscript{115} in their paper, have presented the analysis of the compiled Bibliography on Doctoral Dissertations in Oilseeds in India in terms of year wise, crop wise and discipline wise growth of doctoral dissertations during the period 1986-96. It examined the bibliographical control of doctoral dissertations.

Chottery Lal (1998)\textsuperscript{116} traced out the origin and development of agricultural libraries in India beginning with the creation of Department of Agriculture in 1873. The recommendation of various committees having bearing on library matters were also discussed and listed the pathos of agricultural libraries, studies the impact of information technology in the storage and retrieval of agricultural information. The author sees a bright future for agricultural libraries in the growing network of information networks.
Hemasundar Naidu and Gunjal (1998) outlined the important components of the agricultural literature. They stressed the need for exchange of publications and discussed exchange relations among the agricultural libraries in India and the type of documents exchanged.

Luz et al (2007) in their paper traced the activities of the CGVlibrary team and outlined some of the ongoing issues and strategies for enhancing impact in developing countries.

Sonal Singh (2008) pointed out the issues of librarians and information managers in Knowledge Management and the suggestion of defined the field of information management of identifying the differences amongst data, information and knowledge and also the implication of these differences for professional education.

Rokade (2008) described the importance of agricultural information sharing and capacity building among the users of the agricultural university and ICAR institute libraries in India and stressed on re-engineering of services, digital library network integrated information systems etc.

Prafulla Kumar (2008) emphasized knowledge management in agricultural university and defined the meaning of knowledge, knowledge management and its classification.
Justin and Davy (2009)\textsuperscript{122} explored and examined the view on open access publishing of researchers involved in agricultural research to establish whether there is support for FAO among the researchers in Zambia.

2.7. IMPACT OF INFORMATION TECHNOLOGY ON AGRICULTURAL INFORMATION

Bose (1976)\textsuperscript{123} proposed a model for evolution of information system for national development and explains the necessary steps to be taken. India participates in both AGRIS and CARIS, and the project aims and services of CARTS. The Research Project Unit of Indian Council of Agricultural Research (ICAR) handles both these FAO projects in India until a fully-fledged computerized Agricultural Research Information and documentation centre is established at ICAR.

Patil and Kumar's (1988)\textsuperscript{124} study dealt with information transfer chain from generation to potential users through various international cooperative efforts in the field of agricultural sciences and technology. The international information system like AGRICOLA, AGRIS and CAB are briefed keeping in view their products, services and how to access them using modern tools so that sustainable information is provided for better agricultural production.

Andre (1988)\textsuperscript{125} discussed the issue of communicating critical information resources to remote places in US using many new technologies available for information dissemination and access. Example from a wide range of institutions will show how the information community is responding to this opportunity and how we,
in the agricultural information community, can play leadership role in this exciting transition.

**Bankapur and Vardaraj (1989)**\(^{126}\) while summing up the entire gamut of the situation analyzed the strategic issues in information technology making a reference to developing countries have pointed out that although there is plenty of 'know-how' available in agricultural sciences at the global level, it is rarely useful to developing countries because of local conditions prevailing with them. The basis strategy should be to develop indigenous database in the literature produced in their respective countries. The existing manual or conventional methods also play vital role in the diffusion and utilization of knowledge, which needs to be continued. Information packages are the need of the hour.

**Bose (1989)**\(^{127}\) stated that computer based catalogue system can save the time and efforts involved in producing the information products and sparing the library staff for important functions like reference services to the users. With the availability of microcomputers and related software at comparatively reasonable cost, Agriculture libraries should come forward to implement the software applications and can give a new look to the entire gamut of library house-keeping operations.

**Harris (1990)**\(^{128}\) focused on some issues or assumptions that information specialists in industrialized countries may find useful to examine before looking at the problems of the developing world and solutions that have worked there. It also covered problems associated with isolation-political, organizational and cultural. The article looked at the economic situation of agricultural research and information. Finally, the article discusses solutions for a variety of libraries and information
centers especially networking and technology based solutions. Many of the sources identify in the references are non-conventional and not retrievable through bibliographic data bases.

Bird and Smith (1990)\textsuperscript{129} reviewed the literature on agriculture and its related fields. The authors discussed major issues and trends in agricultural information, agricultural libraries and in doing so, have relied upon the diverse and expanding literature on agricultural information. This review provides a framework for understanding the current and future status of agricultural information and agricultural libraries. Information plays an important role in agricultural research and development. It helps in keeping the research workers abreast of what is going on the fields of specific interest in the minimum possible time. In this information age tremendous flow of information is emerging particularly in the field of Agro-Biology, Biotechnology, Tissue culture, Agro-forestry etc. As such, the problem of providing information in time is not due to lack of information. Existing information is capable of providing the services as expected. Increasing the efficiency of the existing system is one of the solutions to the problem. To improve efficiency, a computer based information system at local level with participation in a network service has to be developed in all the agricultural libraries in the country as it is more convenient, more flexible and more comprehensive and in the long run more economical.

Morton (1991)\textsuperscript{130} discussed the need to maintain and update the skills of professional staff in a changing technological environment and presents special training problems in an agricultural library system that are widely spread geographically. The development of in-house training standards and schedules for both searching and for local computer application is outlined. The resolution of
questions on shared funding with host establishments is described, as is the training of end users to access and exploit network information services in the absence of intermediaries. The use of electronic mail to hasten document deliveries and the introduction of CD-ROM facilities to end-users was discussed.

Beecher (1991)\textsuperscript{131} described the United states Agricultural Information Network (USAIN) as the first organization developed specifically to provide a national forum through which U.S. agricultural librarians might address many issues associated with the collection, access and delivery of agricultural information.

Van Hartvelt (1991)\textsuperscript{132} explained the activities of Royal Tropical Institute (KIT). The projects consisted of the supply of workstations including hardware, software; agricultural databases on CD-ROM; and the training in basic PC skills, word processing and literature retrieval.

Zhang (1991)\textsuperscript{133} reviewed the design of a cooperative Acquisition Programme (CAP) for a regional network –ZALINET –in China. The model is presented both descriptively and quantitatively for the purpose of design and planning. The types of participating libraries and potential network users are identified in the following sectors; research, education, production, government department and marketing. A descriptive model has been worked out of the distribution of information resources.

Attaullah and Johnson (1991)\textsuperscript{134} described about the activities of the North-West Frontier Province (NWFP) Agricultural University in Peshawar, Pakistan which was recently combined with the Ministry of Agriculture Research Station in NWFP to
upgrade both the research and training capabilities for agricultural scientists in the province. Various steps and stages of the modernization of the information storage and retrieval systems and implementation of services for faculty, students and provincial agricultural scientists are outlines.

Chottey Lal and Bhatia (1993)\textsuperscript{135} opined that it is “better late than never” situation in the case of Indian Agricultural Libraries. Since published literature is increasingly made available on CDs, Floppies/ Diskettes etc., the agricultural libraries cannot afford to lag behind in their procurement and use. Suggested that to solve many problems faced by the Indian libraries latest technologies can be incorporated into library operations.

Krieger and Schmiol (1993)\textsuperscript{136} explained the retrieval mechanism for AGRIS. The databases are available on CD-ROM. A special searching feature, AGROVOC, is a multilingual thesaurus of Agricultural terminology, in English, French, Spanish, Italian and German and is AGRIS’s attempt to respond to demands for multilingual access the database. The thesaurus is divided into two main sections: a list of permuted terms providing access to online thesaurus via descriptors and cross references; and a term detail section providing information about relationships between descriptors.

Monaterios (1993)\textsuperscript{137} described about AGRISEARCH, a CD-ROM database, produced by Silver Platter information institution, aiming to coordinate current agricultural research projects in Africa, Australia, Canada, Europe and the USA. Concludes that, considering this is the first attempt to harmonize agricultural research
project information, the database has much to offer those involved in the
development, planning and coordination of agricultural research.

Zhang (1994) observed that the development of agriculture and the reform to the rural economy in China in the last decade has brought about great changes, which have raised increased demand for information and highlighted in inadequate performance of existing agricultural library and information systems. A critical overview of China's agricultural library and information system is given, with particular emphasis on the future importance of networking.

Britton (1995) discussed the role of the Ohio Agricultural Research and Development Center which became agriculture information provider on the Cleveland Free-Net, the first community based computer system.

Perera (1995) traced out the development of Agricultural Information Network in Sri Lanka from its beginning in 1982 with 24 member librarians attached to research institutes and universities. The system presently serves the information needs of agricultural sector with 26 member libraries to nearly 1000 agricultural scientists scattered around the country using modern information processing and dissemination technologies.

Addison and Cullen (1996) discussed the National Resources Institute (NRI) which disseminates information on research and new techniques in natural resources management to developing countries to appear the reviews existing services in Africa, discussing the networks available, the technologies used and the
organizations involved. The impacts, real and potential, of networks on the way people work, the human feedback factor perceptible at NRI and implication for information management are examined.

Kaur (1996)\textsuperscript{142} analysed the use of computer and CD-ROM in the libraries of Agricultural Universities and Research Institutes in the states of Punjab, Haryana and Himachal Pradesh and offers brief suggestions for the efficient use of computer and CD-ROM for improving the working of these libraries.

Gajendra Singh and Kushal Pal (1998)\textsuperscript{143} reviewed the development of Indian National Agricultural Research System (NARS) with its nationwide network of educational and research institution consisting of State Agricultural Universities, Zonal research institution, ICAR institutions with regional station established Agricultural Research Information System in 1995 to strengthen its research information base with funds from National Agricultural Research Project. It has two main components: creation of infrastructure for providing electronic connectivity and creation of MIS and computerized/electronic database of Indian research findings of NARS in various fields of agriculture and allied fields.

Kannappanavar and Vijaya Kumar (2001)\textsuperscript{144} described the use of hardware and software facilities in the University of Agricultural Science Libraries in Karnataka state. A survey conducted in agricultural universities in Karnataka at Dharwar and Bangalore, found that neither institutions was making much use of databases nor implementing information technology in their libraries.
Imma et al (2007)\textsuperscript{145} in their paper presented the possibility to address the accessibility, availability and interoperability issues of exchanging agricultural research output. The paper illustrates how the Open Access and the Open Archive Initiative models can be used within the AGRIS Network as a means of solving the problems of dissemination and exchange possibilities between researchers in agricultural sciences and technology.

Narendra Kumar, Nageshvara Rao and Ramesh Babu (2008)\textsuperscript{146} have presented a paper which aims to study and analyse the various aspects of the credibility of State Agricultural Universities websites in India and analysed the data represents and level of credibility possessed.

Balwan Singh (2009)\textsuperscript{147} highlighted the survey conducted through questionnaire among nine Agricultural University Libraries of North India to know the present status of digitization and finds out the problems and prospects associated in it.

Ramesh Babu, Jeyshankar and Nageshvara Rao (2009)\textsuperscript{148} analysed the link-based website impact measure known as the web impact factor (WIF). Investigated domain systems of the websites, analysed the number of WebPages and link pages and calculate simple Web Impact Factor. The study also warns against taking the analogy between citation analysis and link analysis too far.

Justin (2009)\textsuperscript{149} discussed the great potential that the Open Access Initiative and Open Archives initiative have to open up and enhance the visibility of Africa's
research outputs and the challenges that must be overcome in order for that potential to be fulfilled.

Veeranjaneyulu, Sreenivas Rao and Ravi Kumar (2010)15 in their article discussed the need of application of latest technology to support the Education, Research and Development in Agricultural Sciences through the initiatives of ICT and specifically National Agricultural Innovative Project. Concluded that to promote the library and information services in effective manner one has to reach the information seeker with in less time.

2.8. AUTOMATED AGRICULTURAL INFORMATION SERVICES

Burton (1978)15 explained about a cooperative programme undertaken by Agricultural Research Service & National Agricultural Library to provide selective dissemination of information service to three groups of land-grant university scientists working in the area of sorghum researchers was undertaken by the Agricultural Research Service and the National Agricultural Library. Analysis of user feedback indicated that BIOSIS previews and the commonwealth Agricultural Bureaus file were the most productive databases.

Subbaiah (1989)15 strongly advocates that it is now inevitable for agricultural libraries to switch over to automation. The librarians and the authorities of institutions should now realize the trends of modernization and adopt the technology for effective dissemination of agricultural information. He suggested for the involvement of both ICAR and State Governments in this regard.

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Thomas (1989) reviewed the developments in networking in United States. Information networking has been a tradition in the agricultural information community. NAL's efforts for the five years have led to the formation of the United States Agricultural Information Network (USAIN), an asson whose goal is to provide a forum for discussion of agricultural information issues.

Ditzler, Veronica and Thompson (1990) provided a broad overview of how document delivery and inter-library loan have changed dramatically in recent decades moving from providing the patron with original materials to providing a photo copy, telefacsimile, and even electronically formatted material. This article discusses ongoing new technology projects, which may influence document delivery CD-ROM online catalogs and databases OCLC, AGRICOLA, ADONIS, Group IV telefacsimile, high speed digital communication networks, text digitizing, expert systems and hyper systems and hyper-media are all part of continuing research and development in document delivery.

Inger (1991) described the origin and growth of the Danish Veterinary and Agricultural Documentation Centre. The centre has the following objectives: to function as the Danish AGRIS input centre, to supply qualified online searching in international agricultural and related databases for private agricultural clients, research institutions and students, to teaching online searching techniques and to supply document delivery for search customers. The Danish Veterinary and Agricultural Library supplies close to 50% of the literature ordered based on the online searches. The remainder is obtained through AGLINET.
Jones (1991) explained the advantages of online services especially for scientists. Librarians are now in a position to take advantage of the opportunities presented by relatively low cost computers, CD-ROM databases available for a fixed annual fee and the reduced online services available on evenings and weaken from vendors such as BRS and DIALOG. By establishing and user search programmes, the librarians moves away the role of directly providing information to users and towards the role of managing or facilitating direct access to information by the user.

Ochs (1991) opined that tele facsimile; computer networks and optical scanning hold great potential for rapid document delivery. Several projects are now underway in the US to combine optical scanning and network transmission for document delivery. The United States National Agricultural Library and the Research Libraries Group are both conducting tests on document transmission via the internet. These projects are discussed briefly. Some of the barriers to the use of scanning, network transmission and fax in the developing countries, such as high costs and dependence on high-speed telecommunications will be discussed.

Arun Kumar Chakraborty (1991) stressed the need for building up a network of documentation and information services in the field of agriculture and allied areas. It delineates an information base for agricultural policy and enumerates categories of information and data requirements, information collecting agencies, important documents as sources of information relating to agriculture. It also mentions briefly about what should be a national policy for agriculture.
Smith and Martin (1993)\textsuperscript{159} reported the findings of a study done at Pennsylvania State University to survey agricultural extension personnel in terms of their use of university library resources. Described the procedure and notes that Pennsylvania State University is looking at this system as a prototype for future document delivery services.

Howard (1994)\textsuperscript{160} refers to the National Agricultural Library (NAL), Washington, DC, as the world's foremost Agricultural Library. He mentions the libraries holdings the largest collection of agricultural sciences. He describes its collection; automated management access to the collection and Caricola highlights the application of expert systems, hypermedia technology, text digitizing, image transmission and other projects and programmes. His research points out search programmes through 14 information centers.

Sittler (1995)\textsuperscript{161} discussed the Texas Agricultural Extension Service (TAEX) that has been experimenting with electronic information services and the World Wide Web (WWW) as an adjunct to traditional information distribution methods. It presents a brief analysis of current use and cost savings achieved; Presents some guidelines for online information providers. Internet information servers allow access to a broader audience at lower cost than traditional distribution.

Haavisto and Ofversten (1996)\textsuperscript{162} in their paper described about the Agro net. By technical nature, the typical services may be classified as electronic mail, information dissemination, information management as well as responding to adhoc service requests. Classified by their contents, these services comprise real time
advisory services, price information, product information, library services, farm business management, bank transaction and so forth. The users include farmers, extension service, research institutes administration, industry, entrepreneurs and consumers. The author predicts that by 1995 Agro net will be commercially profitable.

Pan Shuchun and Pijiezheng (2006) in their paper described the current practices and a general framework for digital information resource development for future national agricultural digital library construction. Agricultural digital information resource sharing and coordinated development has been on the main themes in China since 2000.

Barnabas (2006) in this paper unveiled successes and efforts made in bridging the digital divide in terms of access to sources of information. He also looks at failures and lessons learned in the process and addresses not only the country’s poor access to global resources but also in country communication among the regions, districts, wards and even between households. It discusses what has worked and what has not and gives reasons for each case.

Rachel (2006) in this paper discussed the evolving trends of partnerships and concludes that if successfully harnessed, they could greatly benefit agricultural information in its aim to alleviate poverty and provide food security. The paper presents various examples of institutional alliances for sharing information resources.
Pandey (2008)\textsuperscript{166} dealt with the automation of libraries of the Universities and Agricultural College Libraries in the State of Chhattisgarh and gave a complete picture of Nehru Library of the Indira Gandhi Agricultural University, Raipur.

Rajput, Pradeep Kumar and Naidu (2009)\textsuperscript{167} discussed the characteristics of agricultural information, application of Information Communication Technology and spreading of agricultural information through Internet tools and highlights research in agriculture and information needs of research and end users.

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