

Information Technology for Agricultural Development in India

Narendrasinh B. Chauhan

Abstract

The role of Information Technology to develop agricultural research, education and extension to improve quality of life in rural area is well established. IT can help an average Indian farmer to get relevant information regarding agro-inputs, crop production technologies, agro processing, market support, agro-finance and management of farm agri-business. The agricultural extension mechanism is becoming dependent on IT to provide appropriate and location specific technologies for the farmers to furnish timely and proficient advice to the farmers IT can be a best mean not only to develop agricultural extension but also to expand agriculture research and education system. The excellent scopes of Internet are waiting to develop agricultural education management through smart exposure of agricultural teachers and educational planners, class rooms, virtual class as well as dropout agricultural learners. For agricultural extension management, role of IT can be encouraged for future resource documentation, as methods of extension and linkage between research and extension. IT in agricultural research management for textual and non textual documentations and deciding prioritization of research areas needs to be reinforced. The crop forecasting, input management, command area management, watershed management, land and water resources development , drinking water potential mapping precision management, natural disaster management, fishery management , hill area development and post harvest management are the key areas, where Information Technology can play its imperative impact.

Introduction

The population of India has already been crossed 103 billion and is still increasing alarmingly and that put a great pressure on the food grain production of India. On a rough reckoning it is an acceptable fact that India achieved a marvellous success in food grain production from a bare 51 million tons in 1951-52 to 212 million tons in 2003 but India is still hungry. What would happen if India needs to produce an additional 50 million tons of food grain by 2010 AD to feed its increased population? This poses a major challenge not only for the policy

makers but also more directly to the agricultural educationist, scientists and extension workers.

The Information and Communication Technologies can generate new opening to bridge the gap between information haves and information have-nots in the developing countries. The task force on 'India as Knowledge Superpower' emphasized the need to harness ICT for community transformation. The agriculturally prosperous developing countries like India cannot overlook agriculture in such transformation. The emerging ICT have momentous role to perform in agricultural development. There are many possibilities of integration of ICT in agricultural, for the overall agricultural and rural development.

Change in focal point:

It is inspiring to note that, in India there is a growing consciousness of the multiple roles that Information Technology (IT) could play in overall growth of the country. The politicians and policy makers have also emphasized the significance of exploiting the profit of IT for the overall progress of the country. It is a solid view of the Government that if any technology can generate new prospects to link the space between haves and have-nots in society in the current time, it is information communication technology. The policy makers have also realized that IT to improve the lives of the two fifth of the population, which lives below the poverty line, the Government must play a catalytic and enabling role. Besides the central administration, several State Governments have also committed themselves to make strategies, which intentionally plan as extensively as possible to capture the benefits of IT, including the less privileged segments of society. In addition to the Central and State Governments, different civil society organizations are also convinced of the potential role of IT on the socio-economic revolution. A number of initiatives towards harnessing IT for rural development and poverty alleviation have been taken by these bodies. Even the private corporate sector, perhaps in the context of declining world demand, is increasingly looking towards the domestic market as a source of revenue generation.

Various Stakeholders:

Nowadays there are various take holders- central and state governments, civil society organizations and the private corporate sector. Depending upon the character of the actors

involved, the information communication technology projects in the country may be broadly separated into two groups. The first group refers to those initiated by the central and state governments essentially concerned with e governance. The second group refers to the initiatives undertaken by the non government organizations and the commercial sector. During the year of 2002, the states like Kerala, Karnataka, Andhra Pradesh, Maharashtra, Bihar, Orissa, Uttar Pradesh, Madhya Pradesh, Gujarat, Haryana, West Bengal, Rajasthan, Punjab, Assam, Nagaland, Delhi and Sikkim have initiated many e-governance to harness advantages of information technology. The inter-state variation in the initiatives for harnessing information technology for development is observed but now all other states have also realized its importance.

Regarding the substance:

Access to information and improved communication is a critical prerequisite for sustainable agricultural development. Recent communication technologies when useful to conditions in rural areas can facilitate advanced communication, boost participation, disseminate information and distribute knowledge and skills. It is said that extension through information technology would be the major form of technology dissemination in the near expectations.

It is experiential that the rural community still has trouble in accessing essential information to make timely decisions. It is necessary that information accessibility is demand driven rather than supply driven. The challenge is not only to improve the accessibility of communication technology to the rural population but also to improve its significance to local development. Considering the important need to access to well-timed information and improved communication, this issue is in center of attention on attempts made in different countries to transfer information to the rural population.

There is a concern that the gap between the information rich and information poor is getting wider. New ITs are creating to solve problems of rural poverty, inequality and giving an opportunity to link the gap between information-rich and information-poor and support sustainable development in rural and agricultural communities. However remote rural communities still lack basic communication infrastructure. The challenge is not only to improve the accessibility of communication technology to the rural population but also to improve the relevance of information to local development.

IT IN AGRICULTURAL EDUCATION MANAGEMENT

Since independence, the higher education system has undergone many changes. The number of universities has gone up from 19 in 1947 to 275 in the year 2000. At the same time the number of colleges have increased from 591 to over 10,000 and students strength from 0.2 million to about 7.0 million. Today with over 3, 00,000 teachers, the Indian higher education system is the second largest in the world. Considering this scenario of agricultural education the enrolment of students in agriculture remained only 1.5% in agriculture and allied fields. However the percentage of students studying for professional degrees is extremely low. In Japan more than 30% students are studying for engineering degrees, whereas in India, it is hardly 5%. Everyday where one college is being opened in India, only 6 % of Indian population in the age groups of 18 to 23 years is getting the benefit of higher education. With this background in view, we can be able to understand, how difficult it is to face the challenges of higher education in 21st Century which is being dominated by the Information Technology. This clearly indicates that all out efforts need to be made in higher education especially in the field of science and technology to harness the youth potential of rural India.

It is estimated that as compared to enrolment of Indian youth (18-23 years), the enrolment is 100% in Canada, 80% in USA, 50% in France and 30% in UK. Even in some of the less developed countries like Thailand, Indonesia, Mexico and Brazil, enrolment ratios are higher than that in India. It is therefore necessary to find out answer to this major problem. This could be only possible through increasing the accessibility of higher education through I.T. and innovative mode of education such as Distance Education or Correspondence Course System. At this stage intervention of IT is required.

- **IT for Agricultural Teachers and Educational Planners:** In order to see successful integration of IT in Agricultural Education we need to empower teachers of agricultural schools, colleges and universities and so also administrators and educational planners. For this purpose at the elementary stage, we are required to arrange training of these personnel in fundamentals of Computers and then gradually introduce the advanced modules for Computer applications. Teachers need to be trained to use computer to prepare their lesson plan, presentations 'on power point, photo scanning and use of LCD. The educational planners and administrators should be trained to prepare Annual Budget Plan, for teaching aids, resource person and material expenditure, infrastructure budget requirements, time tables to monitor and scheduling the teaching resources, to build up and maintain comprehensive students records and students files etc.

Teacher's role has been changed in IT based agricultural education. Now instead of

just information carriers, they have also become information guide or information facilitators to the learners, who have always multiple sources of information.

The Teachers of IT based agricultural education need to be trained to prepare for "Virtual Class Room". For this, they should prepare slides, record their sound of lecture on Computer itself and this recorded lecture is being attended by his learners in 'Virtual Class'. The module courses will have to be designed for virtual Class Studies and 'Network Based Education' or 'Information and Communication Technology (ICT).

IT along with Internet Expertise is boon to the Distance mode of education. Under Open University or School Education pattern, the learners do attend classes by visiting their respective study centres and attend lectures of their teacher counselors. However, with the introduction of IT the Learner need not come to institutes and study centre but they can attend his virtual class at his home. For this purpose teachers are required to train to prepare 'Training Capsule' for virtual class through which the students or learners can access on their internet facilities. The teachers will have to be trained in E-mail, chatting, surfing, teleconferencing, video conferencing and all latest communication technologies.

- **IT in Agricultural Learners in Class Rooms :** The learners or students in Agricultural School and Colleges need to be well acquainted with 'understanding the lessons projected on the LCD Screen, using power point presentation. Until now the learners of classrooms are in habits of listening lectures with the help of overhead projectors (OHP). Sometimes video films, online internet presentations can also be shown on screen with LCD. The use of CD ROM, on specialized topics on agriculture can also be displayed on computer monitors.
- **IT for Agricultural Learners in Virtual Classes:** With the advent of Internet, Technology, the learners can attend 'Virtual Class' on the monitor of their computer at their homes or workplace. Here the Learners will have to be trained in using Internet Technology i.e. in this case how to log on, do searching and save the information on computer itself. After attending 'Virtual Class' on Computer, one can appear for 'ON LINE' examination test wherein the student will be required to type answer on computer and he will know his evaluation report on screen immediately. Virtual classes are stepping stones for building future Virtual Colleges and Virtual Universities. The Virtual Colleges and Virtual Universities are equally useful for both thinly and thickly populated countries.

- **New IT Dimensions of Agricultural Education in India:** To prepare the agricultural graduates capable to meet the challenges of the new millennium, they should be given course on International Agriculture, WTO, Trade Related Intellectual Property Rights (TRIPs), Global Conventions on Climate, Biodiversity and Desertification, Computer Technology, Patent and Trade Literacy, International Standards. For this IT can play important role. So Introduction to Computers, Application of Software, Data Base Management Systems, PowerPoint, Drawing Software, Computer Programming, Multimedia, Internet, role of TV and Radio in ICT should be a part of their course curriculum.
- **IT for Agricultural Empowerment Dimension:** There are a large number of dropouts in rural schools and a major segment of the rural population is still unreachable. Every State Agriculture Department should establish independent cells for Distance Education for training these dropouts and rural youth for imparting short-term courses in newer skills in agriculture and allied sciences to improve farming. For this IT can play important role.
- **IT to link all agricultural Colleges of India:** Nowadays there is no any direct link between all the agricultural colleges of India. IT can be an effective mean to link all the agricultural colleges of India. In academic field it is said that if we have good contacts with other institutions we can be able to know their academic development and compare our work with other them. This kind of contacts gives us opportunity to make necessary changes in our style of work for desired result. IT facility makes person cosmopolitan in nature. Exchange of useful information like collection of question papers, recent trend, information on seminar, symposium, workshop, training and any other academic developmental activity can be known easily through the IT. It should be the foremost duty of Indian agricultural educational planners to introduce IT in all the agricultural colleges of India and link them with each other to make best use the libraries of agricultural colleges and faculties. Some basic reforms required for this is training to the library personnel of the agricultural universities and colleges in latest computerization process of libraries with newly introduced IT. The establishment of databank in libraries facilitate will be useful not only to the researchers and teachers but also very useful for students as a future researchers. The human resource management for agricultural education has also assumed an extra ordinary significance as the IT involvement has supplemented a new breadth of virtual classrooms, accessibility of information through Internet.

IT IN AGRICULTURAL RESEARCH MANAGEMENT

The major contribution of agricultural research in India has been reflected in various agricultural revolutions during the post independence period. The result of agricultural research boosted the food production and we could see the Green, White, Blue and Yellow revolutions in the fields of Cereal crops (wheat), Milk, Fisheries and the Oil Seeds witnessing the Golden Revolution of horticulture crop production. However with the advent of new emerging agricultural technologies there was a change in focus from increased production to increased efficiency.

The new areas of concerns for agricultural research included the sustainability in agriculture, food security and demand driven research than merely the supply driven. For this purpose, the findings of laboratory research need to reach the unreached. Further for this dissemination a careful documentation methodology and proper communication media will play a significant role. In this sphere, the Information Technology can be fully utilized for proper transfer of technology to the farming community and also those living in remote areas of villages. However there is still scope for tapping and harnessing all available resources in areas of application of Information Technology. Hence it is worthwhile to strengthen the role of IT in agricultural research management.

IT can be the best mean for research documentation, experiments, and analysis of results presentations. In the changing scenario under Indian and global context affect the entire process of agricultural research, especially the identification of thrust areas of research. The skill to distinguish between what is urgent and what is important will hold key to the success in deciding priorities. Such skill can be acquired by IT.

- **IT for research documentations: Textual and Non textual documents**
Textual documents – To present information in the form of *Written text* e.g. books, periodicals, catalogues, statistical compendia, trade publications, patents, etc. and *Non textual documents* - e.g. maps, plans, graphs, diagrams, posters, paintings, photographs, slides, sound tapes, films, videotapes, artistic monuments and magnetic documents for computer processing IT can be the best mean in agricultural research management.

- **IT in Prioritization of Research:** The changing scenario under Indian and global context affects the entire process of agricultural research, especially the identification of thrust areas of research. The skill to distinguish between what is urgent and what is important will hold key to the success in deciding priorities. Such skill can be acquired by IT.
- **IT in Research Communication:** The benefits of Internet connectivity can be utilized for better collaboration amongst scientists for exchange of their views.

IT IN AGRICULTURAL EXTENSION MANAGEMENT

The present age has been rightly termed as an “information age”. People want adequate and authentic information as early as possible. Farmers as human beings are also anxious and become more desirous with the advancement in science and technology to know what is happening in the field of agriculture. Farmers have enthusiasm to obtain knowledge, particularly in the field of modern agriculture to become psychologically strong and conducive with necessary capacities to adopt modern methods of agriculture. In India, it is very difficult to contact each and every farmer in limited time to communicate latest agricultural technology. To diminish this difficulty, various mass media are certainly most effective avenues to convey information to the broad means of people, particularly to the huge illiterate segment of the farmers.

Up till now in India among various media, radio, television, literature and newspapers are certainly most utilized by the extension workers to transfer agricultural technology to the huge illiterate and literate segments of the rural. We are observing a great transformation in agricultural extension approach in dissemination of knowledge. This revolutionize is due to more expansion in farming system fairly than the earlier accent of yield improvement. Even at previous junctures of agriculture extension growth, the style was information provide oriented to a certain extent than farmers' demands driven.

The advancement made in information technology is so fast that every areas of livelihood have to be well organized to strap up such technology. We have experienced that generally the benefits of information technology have restricted primarily to the urban areas. This is only due to lack of understanding about the new Information Technology. However as a result

of new approach of strengthening the communication and training centers like Agricultural Science Centers and Farmers Training Centers, the whole agriculture extension structure has been reinforced again. With a view to understanding the impact of IT in transfer of agricultural technology, the resource documentation and its application play central role as the agriculture extension approaches are shifting gradually.

The Agricultural Extension System (AES) has five important pre requisites 1.Regular training and maintaining of extension workers and functionaries at various levels in the specific knowledge and skills. 2. Monitoring the AES and understanding the constraints. 3. Strong information, documentation and publication support. 4. Effective institutional network for synergetic support. 5. Develop national and international linkages. For this strong information, documentation and publication support are very pivotal. IT can play significant role in this.

- **Planning for Future Resource Documentation:** The production of CD ROM on special topics can be the best mean for future resources documentations.
- **IT in Methods of Extension: E-Extension:** This a new term coined for electronic extension approach, which is otherwise can be called as I.T. oriented Extension.
- **For the linkage between Research, Extension and IT 's role can be encouraged :** The network between different agencies like Agricultural Science Centers (Known as Krushi Vigyan Kendra) ,Farmers Training Centers , Agricultural Technology Management Agency and Information Shops needs to be developed for useful linkage and proper utilization of available resources. The human resources will have to be trained in usage of IT Tools and all infrastructure facilities required for strengthening the Agricultural extension System and Services.

IT IN AGRO-BASED RURAL DEVELOPMENT

It is assumed that 60 to 85% of household consumption belongs to agricultural products so agriculture plays important role in industrial development, it provides raw materials to industries like cotton textiles, jute, sugar, tobacco, edible and non edible oils, leather, plantation industries etc. The food processing industries is also dependent on agriculture. Lots of agro based materials are exported in European and Gulf countries by India. In all such agro

-based industries, role of IT needs to be improved. IT Tools are very useful in creating effective linkages in agro based industry activities. These linkages are concerning dissemination of useful information. Linkages of the producers can be with State Federations and National Federation and Board, Finance Corporation. Advertisement is best way to add value of products. This market again can be very well established with available database of product wise information on products with comprising data of competing nations of the world. IT can help in this direction.

IT IN AGRICULTURAL PRODUCTION

The IT Approach for commercial crops, horticultural crops or floriculture have to focus on Integrated System may be for plant nutrition or plant protection. The well established Integrated Plant Nutrition Approach and Management and Integrated Pest Management (IPM) need to be strengthened with the help of IT Tools. The Post Production Technology (PPT) needs to be utilized properly. The end user, beneficiaries and all concerned especially with export of agricultural produce need to be trained to access the Internet facilities available as one of the most useful IT Tools of the computer era.

IT AS GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN AGRICULTURE:

The use of IT through GIS is very encouraging in India. The important areas like Crop forecasting (procurement policy, crop insurance, relief measure) , Cropping System (input management : fertilizer, Crop Diversification, intensification, degradation measures, sustainability measures), Command Area Management ,Watershed Management ,Land and Water Resources Development ,Drinking Water Potential Mapping Precision , Natural Disaster Management (flood, drought), Fishery (inland, Marine), Hill Area Agriculture Development Management, Post Harvest Management and Precision Farming can be reinforced with the help of Information technology in India.

Indian Agricultural Web Sites

- www.ycmou.com/agri
- www.khetiwadi.com
- www.kisan.net
- www.krishiworld.com
- www.nic.in/agrico

- www.pravara.com
- www.agrinto.com
- www.nabard.org
- www.agriwatch.com
- www.ciks.org/agri.html
- www.agri.mah.nic.in

Scope of rural Internet:

Enormous benefits await rural communities and agricultural organizations when communication improves between the non-governmental organizations, government services, private sector entities and educational institutes that support rural and agricultural development. By sharing information about their activities in the fields of agriculture, rural development, forestry, fisheries, health, nutrition, and education, these agencies can better serve rural people and farmers. They can make use of "lessons learned," determine and use "best practices," and coordinate information about particular regions or successful development approaches. At the same time, rural communities and agricultural organizations can benefit equally from improved vertical channels of communication that enable rural extension agencies and farmers to communicate with decision-makers and others concerned with development.

An integrated approach to the expansion of Internet services will promote often-neglected horizontal communication between agencies linked to rural and agricultural development. At the same time, an integrated approach will provide the tools to enable rural people and farmers to enter directly into new vertical communication relationships with external agencies. Improving horizontal communication can improve the quality and relevance of information resources and physical resources available to rural people. Improving vertical communication between rural people, farmers and decision-makers can improve the quality of decisions that affect rural communities and agricultural organizations. An integrated approach provides for vertical communication by establishing rural Internet access sites, and by enhancing horizontal communication between such entities as agricultural development organizations, agricultural input and equipment suppliers, government extension services, rural development organizations, health care agencies, and agricultural research and documentation centres.

Improved horizontal communication can also include existing media services that serve rural stakeholders. For example, throughout the developing world, rural radio and, increasingly, television broadcast services, are important information delivery mechanisms. Their services improve significantly through the exchange of information and news by way of the Internet.

Internet services, in conjunction with existing and more widely used communication media such as rural radio, will enable the broadest enhancement of information and communication resources for rural people. For example, national or regional agricultural market information systems or extension information systems hosted on the Internet can be excellent information sources for the staff of rural radio stations throughout a region or nation. Using information on current market prices including national variations and international figures broadcast by rural radio stations, farmers can negotiate better prices from local buyers.

Improved horizontal communication and improved information resources can improve the quality of the decisions and interventions that impact upon rural people. At the same time, these improvements can enhance rural peoples' direct participation in development. Establishing rural Internet access sites and facilities in concert with efforts to enhance horizontal communication networks among the agencies involved in rural and agricultural development is the essence of the integrated approach highlighted in this paper.

Experiences of Rural Internet users of many developing and developed countries indicate that the Internet provides them with a very convenient method for quickly accessing a large volume of information without being impeded by geographic barriers in the form of new ideas, discussion, expert advice, continuing education resources, increased global understanding and cultural awareness, and information that helps to make them better and more informed citizens. In addition to this, social benefits including new opportunities to overcome geographic isolation, increased social interaction, opportunities to organize and advocate for social change, equalization of urban/rural disparities and new links between urban and rural communities were also experienced. Agribusiness users emphasize the Internet's value in enabling them to expand their markets to global audiences and to establish national and global business networks and alliances that would otherwise be inaccessible.

Issue of IT based Extension in India:

Access to satellite based Internet is a big challenge in developing nation like India. Poor quality of connectivity, low bandwidths is very common problems. In India, waiting for years to own a telephone connection in most parts, except metropolitan areas, was a big problem. Now a day the number of rural and urban fixed telephones and cellular mobiles are growing with the help of policy initiatives and market potential. At the same time, more thrust towards wiring rural people, especially in a country like India where large sections of people live in rural areas, is still needed. Unless these people are connected, 'India going on-line' will once again divide the rich and the poor. It needs more conviction and political will to focus the rural unconnected in the Market age.

The second major problem with regard to using satellite based communication for extension is content availability in the Internet. Even if a person from a developing country is connected, he/she is connected to western information. 97 per cent of all Internet hosts are in developed nations, home to 16 per cent of the world's population. ⁶ Statistics show the majority of users are from developed nations. Naturally, the information available on line is not meant for developing countries citizens. The information for development from developing countries perspectives and the database creation of local knowledge and practices according to their demand is little available or not at all. More than the access to technology, content creation seems to be a very difficult task.

Take the case of indigenous knowledge and traditional agricultural practices in a country like India, which is valuable. Eminent people have been emphasizing the need to document such practices to help sustainable development for a better world. Unless a specific content creation effort is going to take place, there is a greater risk of this knowledge being endangered. The developing nations will have to borrow the technology and not necessarily all the content.

In order to arrive at a reasonably clear picture of the country of existing communication habits and channels in rural areas, especially among the poorer households, from an analysis of the available data, certain trends emerged. For example, of the total households, the telephone density is as low as phones per household. Reach of electronic

media, especially television, is reasonably high when one considers the prevalence of poverty in the villages of India. The predominant sources of information are the local petty shopkeeper, the market place, and the agricultural input supplier. A very considerable amount of information transaction takes place between the rural poor households and this also acts as a primary source of information. In other words, the information channels start and terminate within the supra-locality.

Establishment of information centers in villages:

It is stressed that Internet initiatives for rural and agricultural development must consider the fact that different regions, organizations and communities have different applications and technical needs. In some areas it is possible to have farmers and rural residents as direct Internet users while in other areas the capacity of intermediary organizations (such as extension field officers, NGOs, rural schools, libraries, health clinics, government satellite offices) need to be built up, or assistance given in the establishment and promotion of community information centres linked to the Internet.

Successful rural and agricultural Internet communication and information systems have some common elements. Some of the elements include preliminary participatory assessment of communication and information needs with intended users. Awareness building, sensitizing decision makers; commitment to participatory rural and agricultural development; user participation in design, implementation and management of information and communication services and commitment to manage and sustain these services; provision for technical training, user support and outreach within the user community.

In our country services provided by the Government are inadequate both in terms of infrastructure, technology and in empowering people with information. To provide information to local rural people through satellite based communication technology according to their needs and demands, Information centre at village level can be established by involving local people in choosing the actual location of center, providing rent free space and electricity and recruiting volunteers.

This concept was first implemented in Sweden. Information centers in isolated rural communities with Pentium personal computers, printers, a modem, a fax machine, Internet and electronic networks, access to databases, libraries and a consultant can make information accessible to a wider audience. Such centers not only facilitate single-point access to external information services e.g. government marketing and price information or to global information through the WWW, but also help in organization of virtual village-to-village meetings and tele-training events thus facilitating local sharing of information.

Each centre should contain data on agriculture, health-related information especially for the rural farmers, women and children. A directory of government schemes should be made available to rural families on local prices of agricultural input or produce, cultural/public events in the locality, local transport/traffic details including timing, grain prices, general and crop insurance schemes, hospitals and medical practitioners, as well as information about integrated pest management in various crops. These databases should be in local languages. In addition, interactive CD-ROMs on various issues can be made available. Information demand is different in each village; hence great care should be taken to address the need for location specific information.

It is stressed that Internet initiatives for rural and agricultural development must consider the fact that different regions, organizations and communities have different applications and technical needs. In some areas it is possible to have farmers and rural

residents as direct Internet users while in other areas the capacity of intermediary organizations (such as extension field officers, NGOs, rural schools, libraries, health clinics, government satellite offices) need to be built up, or assistance given in the establishment and promotion of community information centres linked to the Internet.

Application of IT based agricultural communication in India:

The global communication revolution has been an important part of our country and now India is opening up to the world economy. As result, the situation has changed dramatically. Though we still have a lot of catching up to do, there is no doubt that the old days and worries there in have gone for good. Like other people, farmers also want latest, newest, most modern, most up-to-date, up-to-the-minute and most recent information of any corner of the world at there door. A few years ago it was difficult to gat such information for Indian farmers, but now in India also many spectacular, wonderful, amazing, fantastic, excellent and fabulous satellite based communication facilities are available in the hand of Indian farmers.

There are cases of application of information and communication technologies in extension that have made a difference in the delivery of extension services in rural India. Some of these include the Warana Wired village Project in Maharashtra; Milk collection in dairy co-operatives (National dairy Development Board); Information Villages Project (MS Swaminathan Research Foundation-International Development Research Centre); Information Technology application for Indian Rural Postal System (CMC Limited, Hyderabad); Knowledge Network for grassroots innovations (IIM, Ahmedabad); Application of Satellite Communication for Training Field Workers and Extension Workers in Rural Areas(ISRO); Computerisation of Mandal Revenue Offices (MROs) and computer aided administration of revenue department in Andhra Pradesh

Warana Wired Village Project:

Warana Nagar, a cluster of 70 villages in Maharashtra is a central eye of the "Wired Villages" project. In 1960, a visionary like Tahasaheb Kore propagated the idea of co-operatives in Warana Nagar, as a method of achieving socio-economic development. He showed how this could bring all the farmers together; to share information, increase productivity, and profits. Thus was born the "Warna Nagar Co-Operative Society". The society has a Chairman and a Board of Members and is free from political influence and society members are free to elect the board members. There are about eight sub co-operative bodies, working under this main society viz.; Wara Dairy Development Society, Wara Co-operative Bank, Wara Foods, Wara Women's Co-operative society etc. Sugarcane is major crop of this area and most of the sugar production of the two districts Kolhapur and Sangli is processed at this Society. From each village 200 - 300 farmers are registered as society members.

The "Wired Village" project was initiated by Mr. Vinay Kore, the son of Mr. Tahasaheb Kore and the present Chairman of the Wara Co-operative Society two years ago and actual implementation began in April 1998. The Project has been jointly implemented by GOI through National Informatics Centre (NIC), Government of Maharashtra and Warana Co-operative Society with the share of financial support being in the ratio of 50:40:10. The manpower and maintenance cost is borne by the Wara Co-operative Society itself. The project area is a cluster of 70 villages consisting of 46 villages from Kolhapur and 24 villages from Sangli districts of Maharashtra.

This project has been initiated to serve the information needs on different crop cultivation practices of major crops, sugarcane cultivation practices, pest and disease control, marketing information, dairy and sugarcane processing information etc. to the farmers, right up to their village level.

NIC, Pune was involved in setting-up the hardware and software and NIC, Delhi established connectivity of WAN links such as VSAT and dial-up connections. The software required for the system such as web page designing, database designing and client based applications used by the farmers such as dairy; sugarcane information systems had been developed by the NIC, Pune.

Network Connectivity

Central Hub

The Central Hub, which is the main server station of "Wired Villages" is situated in Tahasaheb Kore Institute of Engineering Technology at Warna Nagar. This is equipped with servers based on Pentium II with 64 MB RAM, 4.1 GB hard disk and 32x CD-ROM drive. The 64 kbps bandwidth VSAT connection has been established as a gateway WAN link to NIC, Pune for connecting into their network and into global network. This enables the main computer center to download information from NIC, Pune or the global network for latest information. The router is used to establish a WAN link to remote computer booths from the main computer centre. Presently the router supports 10 simultaneous connections i.e. 10 users can access information at a time.

Computer Booths

The Computer Booths are serving as information centers for the farmers in their villages. The computer booth is operated by the booth operator and he is the main linkage between the farmers and information gateway center. The information sought relates to crops cultivation practices, land development, pesticides, diseases control details, marketing details, bills payments positions of sugarcane and dairy etc. Currently forty-six computer booths are functioning in Kolhapur and meeting the information needs of the farmers. In remaining 24 villages of Sangli district, computer booths and hardware was setup, and are waiting to link to Central Server Station.

Apart from information retrieval, there are two client-based applications, to serve the farmers' needs. They are (1) Dairy Information System (2) Sugarcane Information System.

In Dairy Information System, the information on all the farmers, who are part of the dairy system, is maintained. Other details available to members of the dairy cooperatives include the quantity of milk supplied by each farmer, fat content, their billing information and credit details etc. This information is maintained and updated at the central database on a daily basis.

In Sugarcane Information System, information on shareholders is maintained to provide guideline for sugar cane crop to about 200-350 shareholders in each village. This system maintains the details of the cultivation schedule, quantity harvested and supplied to the society, deductions effected by the Society towards credit, net income due to the farmers is available with respect to each shareholder.

Every village is also linked with the Directorate of Marketing in Pune, which facilitates farmers in getting information on rates of vegetables, fruits and other crops.

The computer booths are provided with a Pentium II computer having 64 MB ram, 2 GB hard disk, printer and a UPS power backup system. Dial-up connectivity with a modem and telephone line has been used to connect the main computer center to retrieve the

information, send the queries, grievances to the central server station. The speed of dial-up connection is around 19200 BPS to 28000 BPS and average connectivity time is about 10 seconds. Telephone charge of around Rs. 350/-, is paid by village level society.

The Information Villages Project:

This project is implemented by the MS Swaminathan Research Foundation in collaboration with International Development Research Centre (IDRC), aimed at bringing the benefits of modern information and communication technologies to rural families in Pondicherry.

Objectives

The prime objective of this project is to assess the impact of ICT in promotion of sustainable agriculture and rural development and document their role in supporting the process of knowledge empowerment of rural families. Where as specific objectives of the project are

1. To set up six Village Information Shops that enable rural families to access modern information and communication technologies
2. To train educated youth especially women, in rural areas in operating Information Shops
3. To train rural youth in the organisation and maintenance of a system that generates locally relevant information from generic information
4. To maintain, update and disseminate information on entitlements to rural families using a blend of modern and existing channels of communication
5. To measure the impact of information shops and ICT through surveys, participatory rural appraisal and other methods and
6. To build models of information dissemination and exchange in rural areas that use advanced information and communication technologies.

The Project is located in the Pondicherry region in South India. A Value Addition Centre (VAC) has been established at Villianur and is functional since February 1998. It acts as the hub of the communication network in the project. Four Village Information Shops have been set up at Kizhur, Mangalam and Embalam, and Veerampatinam. An office in Villianur, serves as a Value Addition Centre. Villianur is a market centre for many hamlets that surround it and is also an administrative node and a road junction. Villianur has been selected based on the access of rural families to infrastructure and markets. Project staff at VAC scans the WWW for useful contacts and technology. Data gathering and value addition to data are carried out here and information is transformed to suit local queries or needs. This is also an exchange point for a variety of locale specific information on health, transport, public events, subsidies, prices etc. Information on developmental programmes (entitlements, credit, inputs etc.) and markets is maintained here.

The Centre has two PCs, a scanner and a printer; a telephone line for long distance calling facility. This telephone has dial up access to Internet provided by VSNL. A LAN based on VHF radio has been established with Villianur office serving as a hub handling voice and data. The strategy is to create a wireless network (VHF) in the local area, which connects to a fixed telephone line through which access to Internet is available. From here e-mail can be sent on-line while e-mail to other villages can be received at Villianur and forwarded.

There is a reading room with a small collection of books and documents in Tamil on various aspects of agricultural production. A collection of government notifications is also maintained in the centre.

A number of locally relevant databases in Tamil have been created to meet the felt needs of the rural families on Families below poverty line, Public welfare schemes or entitlements to the rural population.

Indian Space Research Organization's Project:

One-way video, two way audio teleconferencing interactive networks have been used for education and training by Indian Space Research Organization. The major application of the network in rural development was for training extension staff from various departments of the state governments. In addition, a large number of women, Panchayati Raj elected officials, primary school teachers, and child development workers spread over large distances have been trained.

Satellite Krushi Gosthi:

Like all other State Agricultural Universities, Gujarat Agricultural University also performs triple functions of teaching, research and extension education. The research generates technologies, which can be utilized by farmers and rural people. The present system of the transfer of technology from Gujarat Agricultural University (GAU) to extension functionaries of the development of the State and in turn to the ultimate users consumes considerable time. Looking to this reality the GAU has prepared a major plan under the name of "GAU Satellite Krushi Gosthi" to apply modern tools like satellite linkage for agriculture sector. The GAU is the first in all SAUs, where such kind of facility has been installed. The GAU satellite Krushi Gosthi for transfer of technology can reduce the time lag to a considerable extent the system helps for large area coverage as well as noticeably reduces the distortion in message transfer. Such facility provides facility for two-way conversation. It helps farmers to get on the spot solutions of their questions and queries regarding the live programmes while watching it at the classroom end. This facility makes possible to keep a live contact between the scientists of the university and the farmers of the state.

Features of the System:

A satellite based distance interactive education system normally consists three elements, first TV studio from where scientists deliver the talk through live programme, second a number of remote classrooms or Direct Reception Centres (DRSs), with the facility of TV set and STD telephone, from where farmers can watch the live programme on TV sets and third satellite linkage to transmit live programme given by scientists from the TV studio to farmers at DRSs.

The Gujarat SATCOM Network has full capability for one-way video and two way audio. RESCO has established SATCOM Network consisting of TV studio at the capital city of Gujarat. The video and audio from TV studio are digitally transmitted to the classroom ends (DRSs). The return audio at classroom (DRSs) is available through STD lines. This facility is used to keep a live contact of the scientists of the university delivering a talk from the studio with those farmers who are watching live programme at the classroom ends. At present more than hundred Direct Reception Stations (DRSs) to receive transmission are already established throughout the state with the collaboration of different departments of Government and NGOs. GAUSATKRU has vital linkage with them. This system helps farmers to receive information regarding inputs as well as markets. This latest satellite based communication facility is also useful to the students of the university to interact with the

dignitaries or experts of agriculture field. To reduce time lag to a considerable extent, such type facility can be also installed in other State Agricultural Universities. Such facility needs to be strengthened at village level with the collaboration of NGOs, schools, co-operatives and Government organizations.

Government of Andhra Pradesh's effort:

Satellite based Information and communication technologies are an important part of the Government of Andhra Pradesh's efforts to improve the efficiency of its administrative offices. AP is the first state in India to design a statewide computerization program that will be used in rural areas, at the administrative unit above the village-level panchayat. There are 1124 mandals in the state. The first software application, is the issuance of certificates pertaining to land holdings, caste, nativity and income across a common counter, without the current delay of 15 to 20-days. The AP State Wide Area Network (APSWAN), aims to link the state government's Secretariat with 23 District Headquarters, serving as the backbone for "multi-services" (voice, video, and data) that would be used for improved co-ordination between state headquarters and district offices in managing various regulatory, developmental, and hazard mitigation programs of the state government. Mandals will be served by this two-way communication, and electronic commerce applications will be developed. The AP Value Added Network Services project hopes to deliver a variety of public services through a large network of information kiosks. The Computer-aided Administration of Registration Department (CARD), a project of A.P. aims to introduce a transparent system of property valuation, which is easily accessible to citizens.

MANAGE's efforts:

The National Institute of Agricultural Extension Management, MANAGE, Hyderabad, has taken-up a number of "Cyber Extension" initiatives, across the country. District level Web Sites are being hosted, Information Kiosks are being established at block/ Mandal and village levels and technical and other need based information is being collected, digitized and hosted on the Internet.

Extension on the Web:

The web was first used to deliver agricultural content to rural US farmers almost ten years ago. The problem is that this use of the web remains at an early stage around the world. It is likely that the Web will expand gradually to many more rural areas of the world because farmers demand it, needed technologies are getting better, and economies of scale are lowering costs. But in the absence of other changes, the web in the short-term will not reach most farmers. There are many variables that impact farming that we cannot control; we can control the creation of information banks to help farmers deal with the variables. There is no global agricultural library in a strong sense, and there could be.

The cost of computers and availability of Internet connections for rural farmers is the big problem. This is the Access issue, but is not the only one. Extension services and other content providers face high costs to develop and maintain web resources. Content might be kept offline to protect print sales or it may be posted only at a fee. When content is online and free, its posting is often uncoordinated with other providers, making it harder to find and utilize. Full text content, databases and decision tools remains relatively rare. There is no global agricultural library in a strong sense, and there could be. The content side of the farmers' digital divide must be addressed as well as the access side. One can argue that this puts the cart before the horse, but we have to prepare for the time when access is there. Bolstering the content side might even speed solutions on the access side.

What can be done to speedup needed changes to reach farmers sooner? The possible answer for this question is creation of ideal websites by key policy makers for extension through involving its real users in planning, implementing and sustaining this modern satellite based extension system.

Production of Ideal Web for extension:

The WWW is often referred to as the 'Web' and provides users with easy access to information resources and services on the Internet. It supports a variety of media formats: text, graphics, images, animations, sound, and video. The Web can be viewed as a multimedia subset of the Internet. Web pages contain multimedia information, hyperlinks and scripts for non-linear navigation. The web pages not only provide users with access to information but also are increasingly being used for communication and collaboration. The 'Web Browser' is a software application that enables users to access resources on the Internet. The first generation of browsers was limited in their functionality and supported only text files. Later generations of browsers are very sophisticated and support multimedia capabilities. They are designed with a graphical interface and are very easy to use.

Creation of web site

- Web site: All your pages, images, and other files make up your "Web site."
- Home page: The first page you want people to see in your set of pages is called the "home page." Other pages are just "pages."
- Web Pages: The documents you see on the Web are called "pages." They contain text, images, and "links" that let you jump to other pages.
- URL: The strings of characters (like <http://www.gauanand.com/>) you keep seeing in advertisements are locations on the Web called Uniform Resource Locators or "URLs". You can pronounce this as "you-are-els" or "earls".

To accelerate use Internet facility by the farmers, agencies involved in satellite-based extension should also create effective Web sites for the farmers. Here hints are given based on recommendations on nine years managing of a small web development lab at the University of Illinois.

1. Conduct Informal Strategic Planning:

Follow these basic steps of group problem-solving to develop plan: Set goals, benchmark, brainstorm, prioritize ideas, and develop an action plan. Include farmers, agribusiness and Govt. officials in the process. Post and update plan to guide development and show progress. Acknowledge contributions to the site by staff and stakeholders.

2. Prototype and Revise Sites:

Favor rapid prototyping and formative evaluation of Web sites rather than long, drawn-out stages of design and evaluation. Don't be afraid to post preliminary content and Web page designs. Unlike the print world, Web 'publishing' is a continuous process of creating and refining documents and page designs. Be flexible and let the process evolve. Typically short fact sheets and brochures go online first, then longer publications. Eventually you can develop decision tools, databases and other interactive features.

3. Identify Content:

Practical coverage of specific crops and growing areas is a must. Examples of high demand content include: Climate and weather, variety testing, pest management, soil treatments, current market prices, and government regulations and programs. List internal content you have in-hand and prioritize it for posting. List and evaluate available external content to which to link.

4. Create an Online Crop Bulletin:

Bulletins of timely crop and pest information during the growing season have proved popular with Illinois farmers it will serve as an entry point to attract users to your full range of online content.

5. Post Handbooks for Farmers:

For example, the online Illinois Agronomy Handbook offers full text chapters, interactive tools and databases. Calculators for nitrogen rate, limestone, seed drop rate, replant decisions, stand counting, and yield estimation allow users to plug in values and to save results for later use. Large databases with climate and soil information provide inputs to calculators. Make your site searchable at no cost by adding Google, Excite or other search engines.

6. Consider Outsourcing Initial Work:

There is no lack of talented Web development experts to maintain a Web server, design sites, post content and create interactive features. Many charge reasonable fees and complete work promptly. They do not need to be on-site; telecommuting does not work for some professions but it works for Web production.

7. Start a Web Production Team:

When you form your own team, hire individuals with multiple skill sets that "can do it all." Or nearly so, programming and design skills do not often mix in the same person. Keeping your core staff small saves funding and helps avoids the bureaucracy created with larger production teams. Add teen-age interns to your team, harnessing their energy and expertise. Nurture a strong everyday relationship between your Web team and your content specialists.

8. Plan for Convergence of Media and Reusability of Content:

Capture synergies by delivering the same content over multiple media. This strategy is central to the much-discussed convergence of traditional media (Snail mail, radio, print, and TV) with new media (e-mail, CD-ROMs and the Web). Insure that your production process routinely produces content in multiple media. You should aim at a modular approach that lets you re-use content in other programs. You can also transfer online content designed for residential instruction to extension and vice-versa.

9. Adopt Standards of the World Wide Web Consortium ("W3"):

W3.org oversees the Web. Following W3 standards makes your Web site as accessible and functional as possible. For example, their meta-data standards help insure that your content is highly searchable. A caveat is that page design for display in Internet Explorer is a de facto 'standard' given their enormous market share among Web users. Design for compatibility with Netscape is important when feasible. Design for accessibility is important, sometimes even the law. Enter your URL at bobby.org to receive a free report on the accessibility of your site.

10. Make Web Server Policies:

Adopt a strategy to manage staff log-ins and passwords to the Web server. Decide which software is best for your staff to create web documents. For example, FrontPage is easy to use but requires special web server extensions and creates non-standard source code. Dream weaver is more powerful and follows W3 standards but novices often find it difficult. Plan a URL scheme before your URLs multiply and get out of hand. Insure their stability, consistency, elegance and intuitiveness. Gradually set standards for Web design including official logos, footers and acknowledgements. Consider use of free open source software like Linux and Apache. Monitor server security issues such as hackers and viruses and make sure your server software is routinely updated with security 'patches.' Provide search capability to

your web site by using the free search capability offered by google.com and other search engines.

11. Market your site:

Submit your site to major portals like Yahoo and to portals specific to Agriculture. Add meta-name entries to your source code to attract search engines. Since 'preferences' of search engines vary, review the site <http://www.searchenginewatch.com> to understand how to tailor meta-names for various search engines. Check by typing keywords from your site into different search engines to check your visibility.

12. Create both National and Regional Portals:

Begin with a national portal but plan and create local portals. The national portal aggregates content into a comprehensive knowledge base of extension information. For example, the Agricultural Gateway to India is a national portal that includes listings of regional and local portals. Several models of community Internet projects provide guidance for planning local portals. For example, perhaps the earliest effort was the M.S. Swaminathan Research Foundation's village knowledge centers in Pondicherry, India. The TARAhaat portal and Babhaleshwar KVK web sites in India also offered early examples of community portals. Newer projects on the scene include Drishtree and n-Logue.

13. Site Design Considerations:

Ease of navigation, quick download and good search ability of your site are key design goals. A comprehensive, regularly updated site index is a must. Design for a lowest common denominator equipment but support higher end users. Assign someone to maintain top-level pages to keep the site dynamic. Have a "What's New" section. Create multi-lingual versions of your most valuable content.

14. Try Web Delivery of Traditional Programs:

Traditional face-to-face programs can be supplemented or replaced with Web-based versions. As supplements they can serve as a primer and follow-up to normal face-to-face programs. As replacements, they can deliver content by slides annotated with voice and by more production-intensive streaming media. Consider use of "virtual classroom" software that offers easy creation and delivery of online programs with presentations, discussions and quizzes.

15. Require Extension Staff to Produce and Post Content:

Web production is becoming as common in the everyday workflow as phone calls, word processing and PowerPoint. Content specialists do not need to be Web specialists but they do need to be able to routinely post content. Content saved as a print document can be easily saved as HTML. Provide a standard design template that allows them to create, post and maintain content without worrying about design. Content specialists can even record multimedia presentations from their desktop. Multimedia created on the desktop won't win awards for technical production but it might for delivering timely content.

16. Require Extension Staff to Utilize Internet Communications:

Staff should routinely utilize e-mail, messaging and even voice/video over IP. It complements your Web-based programs and captures efficiencies. Communications will be speedier, electronic archives can be maintained and ties to clients and stakeholders strengthened.

17. Train Extension Staff to use the Web:

Deliver training on key software over the Web whenever possible. Use existing online tutorials such as ones produced by the Land Grant Training Alliance. Provide a virtual help

desk for staff (and site visitors) that receives and replies to instant messages and e-mail requests for help on software issues. Always archive the replies into lasting FAQs.

Considering the basic preferences of extension Web users:

An effective use of extension is possible; if it is created looking to the expectations, needs and interest of its real users. Here some basic preferences of extension Web users are explained.

1. Data Visualization: The use of visualization technologies like Global Information Systems needs to be strengthened, GIS has begun on some extension Web sites. Extensive databases of GIS data for a region are compiled from sources like water, geology, and natural history surveys. Before these Extension services combined such data and made it Web-accessible, it was not possible to view data layers created by multiple units of a state government in one place.

2. Simulation: Simple Web-based simulation tools are a reality but it will take longer to create robust systems that allow farmers to run complex simulations. Farmers would enter their own data into a simulation engine in order to model crop growth over the growing season based on inputs like climate, soil types, seed type, and soil treatments. Projections of the bottom-line of alternative planting scenarios would also be calculated. Impact on natural resource systems is being worked on too, allowing farmers to assess impacts of soil treatments and other inputs on watersheds.

3. Ubiquitous Access: Farmers would be able to access your documents, tools and databases anytime and anywhere. Such capability has been prototyped in the delivery of climate information and agronomy calculators to cell phones and PDA units like the Palm and Pocket PC.

4. Digital Library Systems: On-line documents grew rapidly at many extension web sites in the 1990's, but these were often posted haphazardly, without meta-data and on different servers, or hidden from search engines in databases. Extension services are now taking steps to create digital libraries of their content. It is wise to consider needed document management strategies such as meta-data and archiving early in your efforts. Distributed digital libraries are a key goal for the coming decade, allowing farmers to transparently search for resources across multiple extension sites, and effectively creating a world-wide library of food, agricultural and natural resource information.

5. Integrated Farm Management Systems: Web-based decision aids for farmers have multiplied in recent years and now they are being integrated into farm management systems. Users gain the value of one-stop shopping for needed tools and information. The tools can even be designed to pass values entered in one tool into other system tools and to securely save data for future sessions. Next generation systems will go much further. For example, knowledge management capability will help farmers to store and harness large amounts of information. Visualization and simulation capability should be integrated into the systems, easing their routine use. Data needed for visualization and simulation won't have to be located; it will be automatically drawn from the knowledge base. Expert systems will help identify pest species and suggest strategies to manage them. Other systems will help manage financial risk or optimize weather predictions. Integrated farm management systems represent an advanced example of cognitive growth. Spreadsheets 'augment' our minds by structuring and calculating the 'numbers' for us, but the combination of a wide range of dedicated and integrated decision aids tied to a powerful knowledge base is a major advance. Farming

decisions involve large amounts of information from different disciplines, constant uncertainty and high financial risk; systems are needed soon to help farmers.

Efforts needed by Policy makers:

For extensive use of satellite based Web extension there is a need to bring some changes in policy are identified and argued here.

1. Collaboration between Content-Providers

Extension services around the world will better reach and help farmers if government, NGOs and Agribusiness collaborate to contribute content. All too often however, extension staff seeking needed content face recurring problems.

2. Infrastructure for Web Delivery to Rural Areas

Many agencies and funding entities have been slow to adopt the Web and have continued costly projects that could be better spent on Web delivery. Sustainable models are out there such as M. S. Swaminathan's Pondicherry project and N-Logue's new Chiraag model for community kiosks, in India. Broadband access is also a question; the most challenging issue that faces web-based extension is the need for affordable broadband access for the rural world.

3. Coordination between Funding Agencies

Agencies that fund agricultural extension and related missions must better coordinate short-term efforts. The World Bank, FAO, UNESCO, USAID and private foundations like Ford and Rockefeller do great things to aid rural development but too often independently. Redundant programs are created, efficiencies are not exploited and potential synergies are lost. Examples of successful coordination are there, but many times reported collaborations do not appear substantial. Thus, proper coordination between funding agencies are needed looking to the needs of small farmers are more important than the benefits of competition.

Summery

The role of Information Technology to develop agriculture and quality of life in rural area is well established. IT can help an average Indian farmer to get relevant information regarding agro-inputs, crop production technologies, agro processing, market support, agro-finance and management of farm agri-business. The agricultural extension mechanism is becoming dependent on IT to provide appropriate and location specific technologies for the farmers to furnish timely and proficient advice to the farmers IT can be a best mean not only to develop agricultural extension but also to expand agriculture research and education system.

A silent revolution is taking place in the communication systems in rural India. Government has taken up a number of satellite based “cyber extension” initiatives, across the country. District level websites are being hosted, Information kiosks are being established at block/mandal and village levels & technical & other need-based information is being collected, designed & hosted on the Internet. Quick dissemination of technological information from the agriculture research system to the farmers in the field and reporting from farmers’ feedback to the research system is one of the critical inputs in transfer of agriculture technology. To reach over 110 million farmers, spread over 500 districts & over 6000 blocks is an up hill task. The diversity of agro ecological situations adds to this challenge further. Farmers’ needs are much more diversified and the knowledge required to address them is beyond the capacity of the grass root level extension functionaries. Today it is possible to find a solution to this situation by using the potential of satellite based Internet based technologies to meet the location specific information needs of the farmers. Information and

communication networks are expanding very fast. Internet connectivity has touched almost all the districts in the country and is moving down to the village levels. Many pilot projects to connect rural community to cyber-space are in progress at various locations. The initial response of rural people, particularly women, has been very encouraging. The experiences of these projects have shown that rural people have been using the Internet in innovative ways. Rural people are looking for weather forecasts, market prices, job appointments and news on the net regularly. They have also started to charge for some of these services selectively. Farmers are also using the Net for getting technical advice online from various sources. Rural people have created their own E-mail accounts and are using this facility for faster communication.

The IT based agricultural information on Net is building up slowly but surely. There is still a lot of work to be done by policy makers to understand and act on this issue because the satellite-based extension through the use of Internet facility still has a long way to go to be "user friendly" for rural people. People who work in the field of satellite based extension should have proper understanding that extension through satellite based communication in rural areas is not impossible but it requires unique administrative, participatory and organizational efforts. Many organizations are supporting a number of SAUs to digitize their technical information on the Web. At the same time research and training organizations, both in public and voluntary sectors are being supported in building their capacity to digitize the rural and agricultural information and make it available on the WWW. Efforts are also being made to connect various districts of our country on the Internet so that the farmers can get all the technical information on the Web sites. If Cyber connectivity will be made available to all India Villages to take benefits of satellite based information and communication technology, the positive change in the face of rural development will be definitely possible.

Citation: Communication Support for Sustainable Development. Eds. Dipak De and Basavaprabhu Jirli, GangaKaveri Publishing House, Jangamawadi Math, Varanasi - 221001
--