“e- Kapas”- a mobile based dissemination system

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Introduction

Approaches to agricultural extension in India and worldwide continue to evolve since Green Revolution in 1970s and 1980s. The Government of India invests heavily in its agricultural extension program, in which trained field officers help communities address common problems and learn about new farming techniques or technologies. However, this program has not lived up to its potential. There is a criticism about the practicing of Agricultural Extension in the current context of globalisation and changing paradigm. The technology transfer was often looked into with a narrower perspective, perhaps only into the prism of adoption despite the scope and claim of broad spectrum of sensitizing the society, identifying the researchable problems and commercialising the research output from the research institutions. The country faces the set of challenges in extension delivery: lack of adequate number of extension staff, limited funding, weak linkages with research, lack of coordination and collaboration among multiple extension providers, lack of adequate capacities among extension staff and lack of professionalism in extension. In cotton crop too in the changing scenario of retaining the top position in acreage and second position in production at world level is a big challenge. Information and communication technologies (ICTs) have the potential to increase the reach of agricultural extension, establish a strong linkage between the research and end users to disseminate the technologies, advisories and create and sustain significant changes in the productivity and profitability. ICT is an umbrella term that includes any communication device or application, such as radio, television, mobile phones, computers and network hardware and software. using the modern advancements in ICT and mobile phone technology, the Central Institute for Cotton Research (CICR) functioning under the Indian Council of Agricultural Research (ICAR) has been executing a novel extension mechanism called “e-Kapas network” for effective knowledge transfer among Indian cotton growers in the current plan period.

Cotton scenario and Spread of technologies

The world cotton area, production and productivity remained to around 36 million hectares, 125 million bales and 763 kg/ha respectively during 2011-12. The biggest cultivators of cotton are America, India, China, Egypt, Pakistan, Sudan and Eastern Europe, with China, US and India being the three largest producers of cotton. US have a considerable share in world exports. India and China both fall short of their domestic requirement and are net importers. India with an annual production of 27.5 million bales (1 bale=170 kg) is the World's third largest cotton producer. India also has the largest area under cotton. India produces around 11% of the world's cotton from 20% of the area. Despite having the largest area under cotton in the world, India ranks third in world output of cotton due to its abysmally low average yield of 491 kg against a world average of 763 kg per hectare . Although cotton is cultivated in almost all the states in the country, ten states viz. Maharashtra, Gujarat, Andhra Pradesh, Madhya Pradesh, Punjab, Haryana, Rajasthan, Tamil

Nadu, Karnataka and Orissa accounts for more than 95% of the area and output . Only one-third of the area is under irrigation, and this causes the cotton output to vary considerably from year to year in response to the vagaries of weather and pest attacks. In India cotton is sown during March to September and harvested during September to April. The peak marketing season for the crop is during November to

Lecture delivered on 10th October 2014 during MTC on "Use of ICT's for increasing production and productivity of oilseeds" during 7-14 October 2014
March. Cotton is the most important raw material for India's Rs. 1, 50,000 crores textile industry,

which accounts for nearly 20% of the total national industrial production and provides employment to over 15 million people. It also accounts for more than 30% of exports, making it India's largest net foreign exchange industry. India earns foreign exchange to the tune of $10-12 billion annually from exports of cotton yarn, thread, fabrics, apparel and made-ups. Cotton accounts for more than 75% of the total fibre that is converted into yarn by the spinning mills in India and 58% of the total textile fabric materials produced in the country.

In country cotton is cultivated in three distinct agro - ecological regions (North, Central and South) but approximately 65 percent of India's cotton is produced on dry land or rainfed situation particularly in states like Maharashtra with highest acreages where hardly 2 percent area is under irrigations. Also a significant change was observed in the area, production and productivity of cotton in India since 2000-2001.

The technologies are spread through extension personnel of the Department of Agriculture and that too mostly been manual since information and communication support during last 65 years has mainly been conventional particularly in cotton crop. Indian cotton sector is facing a serious challenge in changing scenario of retaining the top position in acreage and second position in production at world level. Although the suitable cotton production technologies have been developed by scientists but there is lack of full adoption of recommendations by the farmers due to poor technology transfer, moreover dissemination of technologies through modern Information and Communication Technologies (ICTs) approach was not taken up anywhere in country. It is therefore necessary to initiate dissemination through ICT approaches as these have the potential to increase the reach of agricultural masses, to speed up the diffusion of technologies from the research system to the end users. Moreover, on the other side, Indian cotton sector is facing serious challenges posed by the changes viz., changing technology "Bt cotton", changing demands of the textile industries and non woven sectors

Cotton Extension Programs in India

In general, supply of information to the farmers belongs to the agricultural extension system of the country. There is a criticism about the practicing of agricultural extension in the current context of globalisation and changing paradigm. The technology transfer was often looked into with a narrower perspective, perhaps only into the prism of adoption despite the scope and claim of broad spectrum of sensitizing the society, identifying the researchable problems and commercialising the research output from the research institutions. Indian cotton extension was not an exception for that and it also was criticized that the results of cotton research did not reach the farmers in time and similarly the requirements of the cotton stakeholders to formulate demand driven research were less identified. The Indian Council of

Agricultural Research has always underlined the importance of Scientist- Farmer linkage for the effective transfer of latest agricultural technologies. Towards this goal, several programmes viz., Lab to Land Programme, Operational Research Project (ORP), Front Line Demonstrations (FLD), Integrated Pest Management (IPM), Integrated Resistance Management (IRM), Institute Village Linkage Programme (IVLP), Intensive Cotton Development Programme (ICDP), Farmers Field Schools (FFS) etc., have been launched and are being implemented for cotton extension by Central Institute for Cotton Research.

These cotton extension programs revealed that they were effective in some aspects viz., in increasing the yields, sharing the knowledge but handicapped due to lack of professional execution and non-availability of latest technological dissemination tools for ready transfer. Many of them excluded the novel extension innovations viz., cyber extension, market led extension, farmer-led extension and environmental extension for a wider reach. Technology forecasting is another major area where our cotton extension programs attempted very less initiatives. Market intelligence surveys for commercializing our technologies and institutional arrangements for freeing indebtedness had never found a significant place in those programs. Media utilization and efforts to organize the cotton growers were the other areas where our cotton extension programs created a meager impact. Also the major cotton Transfer of Technology (TOT) efforts tried so far to disseminate the innovations and bridge up the gap viz., Front Line Demonstrations, Farmers Field Schools etc., were basically developed for other crops in other countries and later replicated in cotton. Also, the Indian cotton sector is facing serious challenges posed by the changes viz., changing technology "Bt cotton", changing demands of the textile industries and non woven sectors and changing scenario of retaining the top position in acreage and second position in production at world level. All these changes could not impact much on our productivity which is a major setback

Information support for Indian cotton growers

The information and communication support for this crop during last 57 years has mainly been conventional. The cotton technologies spread through extension personnel of the Department of Agriculture was mostly manual. This approach has not been able to reach majority of the cotton farmers who are spread across the whole country. This gap remains a challenge for the cotton extension system even today. To reach over 12 million hectare farms, spread over ten states is an uphill task. The diversity of agro-ecological situations in all these ten states adds to this challenge further. The needs of cotton farmers in these states are much more diversified and the knowledge required to address them is beyond the capacity of the grass root level extension functionaries. Hence, in order to speed up the diffusion of technologies from the research system to the end users and to identify the farmers' need to formulate demand driven research developing a novel extension mechanism for effective knowledge transfer and researchable feed back in cotton is inevitable. Today it is possible to find a solution to this situation by using the potential of ICT to meet the location specific information needs of the farmers. The increasing penetration of mobile networks and handsets in India, therefore, presents an opportunity to overcome information asymmetry and to make useful information more widely and swiftly available to all cotton growers.

Changes and Challenges in Indian Agricultural Extension System due to ICT

The recent advances in ICT have changed the way knowledge is produced, processed, stored, retrieved and disseminated to different stakeholders in agriculture (Ansari et al., 2013). The

country has the huge potential of harnessing ICT for agricultural development. e-Mails, Expert Systems – Information system, Decision Support System and Crop Doctor, Video Conferencing, Interactive multimedia, Web search tools, Social media, Pedia, Video and Data base are the major ICT tools used for disseminating the agricultural information in the country. The ICT initiatives in Indian agricultural extension system were Web portals – Knowledge Repositories based online advisory and market services, Village Knowledge Centres (VKCs) & Village Resource Centres (VRCs), Mobile based advisory services and Hybrid initiatives. Despite the huge potential of harnessing ICT for agricultural development, only a few isolated projects have been initiated in India due to various grass root level challenges. Many villages in India lack facilities for communication backbone. Educating and catering to the information needs of farmers in the villages in India would require immense financial investment. Insufficient power availability in some rural areas, poor ICT infrastructure, ICT illiteracy, non availability of timely advisory, relevant content, non-integration of services, poor advisory services and lack of localization were the major challenges faced in implementing ICT based advisories.

Mobile phone – An advantageous ICT tool for TOT in India

Among the various ICT tools, majority of the Indian farmers own mobile phones. The availability and accessibility of mobile phones among the farmers was higher than any other ICT tools. India's telecommunication network is the second largest in the world based on the total number of telephone users (both fixed and mobile phone) (Economic times, 2012). It has one of the lowest call tariffs in the world enabled by the mega telephone networks. The mobile subscriber base has grown by a factor of over a hundred and thirty, from 5 million subscribers in 2001 to over 929 million subscribers as of May 2012 (Subscriber Statistics, 2012). Mobile phones have the advantages of having many additional services in addition to the standard voice function such as SMS for text messaging, email, packet switching for access to the Internet, gaming, Bluetooth, infrared, camera with video recorder and MMS for sending and receiving photos and video. The advent, acceptance and proliferation of mobile phones have democratized opportunities and avenues for millions of farmers in the country. The farmers in the rural areas are now interconnected to other areas due to cellular communication technologies. The voice SMS option in the mobile phones facilitates the illiterate farmers to get the information without any difficulties.

'e- Kapas' network for Technology Dissemination - CICR Initiative

Viewing the modern advancements in ICT and advantages in mobile phone technology, the Central Institute for Cotton Research functioning under the Indian Council of Agricultural Research has been executing a novel extension mechanism called "e-Kapas network" for effective knowledge transfer among Indian cotton growers in the current plan period. "e" meant for electronic and "Kapas" in Hindi (one of the major Indian languages) means cotton. 'e - Kapas' essentially refers to the utilization of electronic devices - mobile phones for delivering cotton technologies to farmers, extension workers and other development workers engaged in cotton sector. The project is functioning under Technology Mission on Cotton-Mini Mission I, a novel approach of the Government of India, to increase the productivity of cotton in the country. The project has been functioning in 17 centres across the ten cotton growing states of the country under the leadership of Central Institute for Cotton Research,

Nagpur. Farmers interested in e-Kapas network register with their local state centres by registering their mobile numbers. Centres send regular Voice SMS about cotton genotypes, production and protection technologies in their local languages to the registered growers. By connecting the cotton growers nationally through e-Kapas network, timely and relevant information with regard to cotton technology is disseminated in swift manner. Warning and alert services are issued to the registered cotton growers for taking proactive measures. It is the 'anywhere and anytime' availability of cotton technologies and services to users. The project also helps in intensive pest monitoring, overcoming pest epidemic situation through awareness and quick advisory provided direct to farmers in vernacular languages (Wasnik et al, 2013)

'e -Kapas' conceptual framework to Improve Access to Information

The conceptual framework used can improve access to and use of information about cotton technologies, potentially improving farmers' learning, As Figure 1 show the information chain starts from the content itself, which flows to the ICT platform and eventually to the user. Characteristics influence the activity at each place requires sourcing and storing centre wise data base to access, assess, and adapt content that is relevant to the users. This content needs to be formatted, translated, and updated as required, through the type of technology—for example, mobile short messaging service or mobile voice messages. Ultimately, the goal is to develop and manage useful content that users can then act upon. As a two-way process, feedback from users to the projects and to the content can also affect what content is used.

The programme therefore designed to cover more than 100000 farmers across the cotton growing states by involving eighteen centres including SAUs working on cotton through mobile- based advisory services. 'e- Kapas' an initiative of utilization of information and communication technologies (ICTs) for delivering appropriate cotton technologies to farmers aims to improve the efficiency of current manual system by saving time, money and making technologies available 'anywhere & anytime' to users . The project is being implemented at 18 centres in ten cotton growing states of the country with CICR Nagpur as Lead centre. The other participating centres viz CICR Regional station Coimbatore (TN) ; CICR Regional station Sirsa (Haryana) and 14 AICCIP- SAUs centres i. e UAS, Dharwad (Karnataka) ; JAU, Junagarh (Gujrat) ; MPAUT, Banswara (Rajsthan) ; RAU, SriganganNagar (Rajsthan) ; ANGRAU, Lam Guntur (AP) ; NAU, Surat (Gujrat) ; CCSHAU, Hisar (Haryana) ; Faridkot PAU, Ludhiana (Punjab) ; PDKV, Akola (MS) ; OAUT, Bhawanipatnam (Orrissa) ; RVSKVV, Khandawa (MP) ; MAU, Parabhani (MS) ; MPKV, Rahuri (MS) and UAS Raichur (Karnataka) caters the need in local languages. Apart from these one more centre DOR, Hyderabad has been added from the year 2014.The advice is provided on a regular basis after registration of cotton growers with their mobile number,collecting information on Frequently Asked Questions ,Development of content in local languages, develop popular dissemination material on cotton production / protection technologies, weather, market information in the format of kapas panchang and kapas pedia

Mobile phones and Information Delivery Services:

To tap Mobile technology, CICR has introduced voice based cotton advisory services to the registered farmers. This service is provided to all farmers irrespective of telecom network. A total of 728516 pre-recorded automatic phone calls on a range of topics during the crop season (June-December, 2013 and 15 June to 31 august 2014) were sent to the registered farmers on more than 90000 mobile numbers. Out of which 474394 attempted successful and

the delivery percentage was 65%. In Nagpur centre around 485205 voice calls were sent to the registered farmers on more than 14000 mobile numbers out of which 238047 attempted successfully and the delivery percentage was 49. The reasons for unsuccessful or failed attempt may be due to network congestions, DND numbers & network busy, switch off, etc. During the system adopted from eworld.com and mobi tech large number of delivery calls in Nagpur were either in DND or failed as compared and delivery percentage was comparatively low to Unicel system. The system was also adopted in case the phone is engaged or outside the coverage area when the voice message is sent, the calls were repeated later a couple of times to ensure that the farmer does not miss the message. The feedback in voice messages revealed that majority of farmers receiving messages indicated that the service is highly accepted by them as it alleviates the language barriers of visual communication. It was noticed that voice is a natural and accessible medium for many small farmers, who often have limited formal education and already access knowledge through oral means, such as listening experts and other farmers

Mobile Technology therefore acts as a potential bridge between resource-persons and grassroots farm families; a vehicle for carrying innovations from the research lab to the remote recipients and a tool to disseminate "Quality Education for all growers"

Challenges in Implementation

The major challenge faced in sending voice SMS was the DND (Do Not Disturb) registration done by majority of the farmers with their mobile service providers. Few of them have given invalid numbers unknowingly. At many occasions, "ring timeout & congestion" were the major constraints experienced in sending e-Kapas alerts to the registered cotton farmers. Moreover, some farmers were hesitant in adopting the technologies that they hear through mobile phone based advisories. Creating awareness about the service among farmers was also seemed to be a challenge.

Future Prospects

Creating awareness about e-Kapas network among all cotton growers in the country and sending advisory to one lakh cotton growers in ten states of the country will be done in the near future years. To change the attitude of farmers towards the fidelity of mobile phone advisory and to win the confidence of the cotton growers, efforts will be taken earnestly. Along with dissemination of technologies, efforts will also be taken to document the cotton related information using ICT tools for future retrieval.

Conclusion

The technologies released from the cotton research system should reach the farmers in time to bring out a breakthrough in the productivity of Indian cotton. The advent, acceptance and proliferation of mobile phones among millions of Indian farmers paved a way for dissemination of yield enhancing cotton technologies to the end users under the umbrella of e-Kapas network in India. The relevant, understandable and need based information in local languages and reach in time facilitated the cotton growers to take timely crop management decisions. For further reaching the unreached through mobile phone based cotton extension, awareness must be created among all levels of Indian cotton growers. Replicating the success of this novel mobile phone based cotton extension model in other crops of the country and in

other cotton growing countries of the world will pave way for profitable and sustainable cotton farming in the coming years.

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