E-KAPAS NETWORK – EXTENSION OF TECHNOLOGIES ON COTTON CULTIVATION THROUGH ICT

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ABSTRACT

Even though India owns the laurels of being first in world acreage and second in cotton production, it has been facing challenges with regard to increasing and sustaining its productivity for many years. Many technologies released from the cotton research system could not bring out a breakthrough in increasing the productivity. Among the various reasons cited for less productivity, lack of information about available yield enhancing cotton technologies is one among the major ones.

The information and communication support for cotton crop in the country during last decades had mainly been conventional. The cotton technologies spread through extension personnel was mostly manual which could not reach majority of the cotton farmers spread across ten cotton growing states of the country. The needs of cotton farmers in these states are much more diversified and 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, Central Institute for Cotton Research has been executing a novel extension mechanism called "e-Kapas network" for effective knowledge transfer. Disseminating cotton technologies through regular voice message alerts in local language to the cotton growers registered with e-Kapas network is the major mandate of this project. Cotton Improvement Project, MPKV, Rahuri, has registered 9644 farmers under e-Kapas network project as a technology mission. So far 573250 voice message alerts have been sent to the registered growers. Network error, No answers, Invalid numbers, and DND registration were the major constraints experienced in receiving e-Kapas alerts.

Keyword: e-Kapas network, Cotton, ICT, Voice message,

I. INTRODUCTION

India has been the ancient home for cotton and cotton textiles since time immemorial. In ancient days, cotton played an important role in the history of India, and continues to be an important crop and commodity of the country. Even though India owns the laurels of being first in world cotton acreage and second in production, it has been facing challenges with regard to increasing and sustaining the crop's productivity for many years. Many technologies released from the cotton research system could not bring out a breakthrough in increasing the productivity. Among the various reasons cited for less productivity, lack of information about available yield enhancing cotton technologies is one among the major ones. In general, supply of information to the cotton

farmers is the responsibility of cotton extension system of the country. The information and communication support for this crop during last 57 years has mainly been conventional.

The advantages of mobile phone technology in agriculture cannot be underplayed. Countries which are already using this technology are using it to help raise farmers' incomes, making agricultural marketing more efficient, lowering information costs, reducing transport costs, and providing a platform to deliver services and innovate. Mobile phones can also serve as the backbone for early warning systems to mitigate agricultural risks and safeguard agricultural incomes. Additional opportunities for more frequent and reliable information sharing will open as technological advances leading to additional convergence between mobile phones and the Internet, GPS, laptops, software, and other ICTs. In their various designs and capabilities, mobile phones can be found in the pockets of the wealthy and poor alike. Even in rural areas, mobile phones are growing in number and sophistication. The rise of the mobile phone has been one of the most stunning changes in India over the past decade. Through this expansion process, formerly costly technologies have quickly become everyday tools for the bottom of the pyramid.

The cotton technologies spread through extension personnel of the state 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. 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 Information and Communication Technologies (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. Hence, using the modern advancements in ICT and mobile phone technology, the Central Institute for Cotton Research (CICR) and Cotton Improvement Project, MPKV, Rahuri, has been executing a novel extension mechanism called "e-Kapas network" for effective knowledge transfer among cotton growers of Western Maharashtra in the current plan period. This paper deals the history of Indian cotton, its scenario since independence, country's cotton extension programs and changes in them due to the development of ICT, current approach of using mobile phones and the success of this mobile phone based cotton extension with empirical evidences.

II. HISTORY OF INDIAN COTTON

In the late 18th and 19th century, the fortunes of Indian cotton seem to have been linked with the adequacy or otherwise of cotton exports to England from America. In an attempt to develop an alternative source of supply (apart from America), the East India Company initiated trials with exotic cottons (new world cotton varieties) introduced into India. The first attempt was made in 1790 AD to grow Bourbon (G. hirsutum race punctatum) variety introduced from Malta and Mauritius in the Bombay and Madras Provinces. The initial trials proved unsatisfactory. In 1840 AD, trials with exotic American cotton were carried out in Gujarat, the Deccan, and the Konkan. New Orleans seed (G. hirsutum race larifolium) was grown in 1842 AD in Hubi taluk of Karnataka and by 1861-62 was grown on 72313 ha. The work on American cotton with upland Georgian and New Orleans

varieties in Dharwar (now Dharwad) and Gadag during the first decade of the 20 th century, established the Dharwar American Cotton Crop. The efforts in the Madras province commenced with Bourbon variety in 1790 and subsequent trials with New Orleans and Sea Island (G. barbadense) in Coimbatore were unsuccessful. After the reorganization of the Madras Department of Agriculture in 1905, American, Peruvian, Egyptian, and Sea Island varieties were experimented with, but without success. The most significant development for the future success and spread of American cotton in India was the introduction of a cotton variety originally found suitable in Indo-China into the Madras Presidency. This variety was known as Cambodia in 1904-5. It proved very successful under irrigated conditions and the cultivars selected from Cambodia have formed the basis for several new varieties and hybrid cottons which were extensively cultivated in later years. Efforts were also made to introduce exotic cotton varieties in other parts of the country.

In 1846 Ad, a few maunds (1 maund = 82.3 lb = 37.3 kg) of seeds were supplied from Bombay (now Mumbai) for trials at Shikarpur in Sind, while in 1852 AD more trials were undertaken with Egyptian, Sea Island, and New Orleans cottons, without much success. The first attempts at growing American cotton varieties in the Punjab were made in 1853 AD but were not successful. Subsequently, seeds obtained from Dharwar were distributed in 1876-77 in parts of the Province. In 1902, a variety named Punjab Narma was found growing in several areas; it presumable descended from earlier introductions of American cotton. The cotton improvement work, initially started in 1902, was shifted to Lyallpur (in Pakistan) in 1903 and variety 4F, a rough-leafed upland type selected to the insect pest jassids. In 1917, out of 111697 ha under American Cotton in the undivided Punjab Province, about 72846 ha were covered by variety 4F. Experiments on growing American cotton in the United Provinces (Uttar Pradesh) commenced in 1826, and an acclimatized variety of mixed origin known as Cawnpore-American was established by 1909, after initial failures to grow it in Allahabad.

III. SCENARIO OF INDIAN COTTON SINCE INDEPENDENCE

India is the first largest cultivator and second largest producer of cotton in the world. It had 5.88 M ha area under cotton in 1950-51 and now has more than 11.5 M ha area under this crop. The production increased from a meager 3.04 M bales (170 kg lint/bale) in 1950-51 to a record production of 37.5 M bales during 2012-13. It occupies the first place in worldwide by occupying 35.29 per cent of the world cotton area and second place by contributing 24 per cent of the world cotton production. Even though it owns the laurels of being first in world acreage and second in production, it has been facing challenges with regard to increasing and sustaining its productivity for many years. Many technologies released from the cotton research system could not bring out a breakthrough in increasing the productivity. Among the various reasons cited for less productivity, lack of information about available yield enhancing cotton technologies is one among the major ones.

IV. 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 globalization 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 commercializing 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.

Analysis on all 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 (Usharani *et al.*, 2011).

V. 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 1.2 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.

VI. 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.

VII. 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, 2014). 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 2014 (Subscriber Statistics, 2014). 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.

VIII. E-KAPAS NETWORK - MOBILE PHONE BASED COTTON EXTENSION MODEL

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 under the leadership of Central Institute for Cotton Research, Nagpur. Farmers interested in e-Kapas network register with the centre by registering their mobile numbers. Centre sends regular Voice SMS about cotton genotypes, production and protection technologies in 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)

IX. E- KAPAS NETWORK AT MPKV, RAHURI – CASE STUDY

As a cooperating centre for e-Kapas network in Maharashtra state, the Central Institute for Cotton Research, MPKV, Rahuri has been actively participating in the project. At the initial stage, the centre identified the cotton growers in the Western Maharashtra region and registered them as beneficiaries in e-Kapas network. The centre also collected the data of cotton growers and developed a data base of e-Kapas network beneficiaries with some essential details about the farmers using one page questionnaire. Simultaneously the centre collected and documented the Frequently Asked Questions (FAQs) in Cotton from nearby Kissan Call Centres. The collected questions were documented with answers as bulletin entitled "FAQs in Cotton" in local language (Marathi) and will be published soon. A "Kapas Panchang (Cotton Calendar)" for 2016 is developed for each cotton growing district in Western Maharashtra for sending the voice SMS at the proper time of field operations. Keeping the FAQs and Kapas Panchang as basis, content was developed for 65 voice SMS of 30 seconds each for the entire cotton season. The content was recorded in Marathi Language and pushed to all registered growers at regular interval. During the year 2015, a total of 9644 farmers had registered with e-Kapas network from major cotton growing districts of Western Maharashtra. Until July 2015, a total of 573250 voice SMS alerts on cotton production technologies have been sent to them.

X. CHALLENGES IN IMPLEMENTATION

The major challenge faced in sending voice SMS was network error and 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, "No answer" was 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.

XI. FUTURE PROSPECTS

Creating awareness about e-Kapas network among all cotton growers in Western Maharashtra region and sending advisory to ten thousand cotton growers 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.

XII. 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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REFERENCES

[1]. Ansari, M. A and Neha Pandey. (2013). Assessing the Potential and Use of Mobile Phones in Agriculture. Karnataka Journal of Agricultural Sciences. 26(3): 388-392.

[2]. Economic times. (2014). India need Umbrella body on telecom. 16 August 2014.

[3]. Subscriber Statistics. (2014). Telecom Regulatory Authority of India, Government of India.

[4]. Usha Rani, S and S. M. Wasnik (2011). Transfer of technology Initiatives for Profitable and Sustainable Cotton Farming in India – An Empirical Analysis. Book of Papers of WCRC-5 held at Mumbai during November 7(11):461-467.

[5]. Wasnik, S.M., Usha Rani, S. and K.R. Kranthi. (2013). e-Kapas Networking of Cotton Farmers: An Innovative and Emerging ICT Approach for Sustainable Cotton production. Book of papers of International Conference on Extension Educational Strategies for Sustainable Agricultural Development – A Global Perspective held at UAS, Bangalore during December 5(8):5-27.