

Dissemination of Cotton Production Technologies through e- Kapas – An ICT Enabled Tool

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ABSTRACT: Information and communication support for cotton farmers during last 65 years has mainly been conventional through extension personnel of Department of Agriculture and that was mostly been manual. This approach has not been able to reach majority of the cotton farmers spread across the Western Maharashtra region. To reach over 12 million hectare farms spread over ten states is an uphill task. Further, the needs of cotton farmers in these states are much more diversified and the knowledge required to them is beyond the capacity of the grass root level extension functionaries. Hence in order to speed up the dissemination of cotton production technologies from research system to end users, a novel extension mechanism of 'e-kapas' networking of farmers has been initiated by Central Institute for Cotton Research, Nagpur aiming to empower cotton farmers with knowledge. CICR has thus designed programme to cover maximum farmers across the cotton growing states. Under this programme Cotton Improvement Project, MPKV, Rahuri (Maharashtra) is catering to the farmer's needs in local regional languages. By using modern ICTs and establishing a strong linkages between research and technology 'e-kapas' system provides an excellent opportunity to reach far and wide spread clientele very quickly with advance viable information and helps in creating and sustaining significant changes in the productivity and profitability.

Key words: e- Kapas, ICT tool, Cotton production technologies.

INTRODUCTION

Cotton is one of the principal cash crops of India and plays a vital role in the country's economic growth by providing substantial employment and making significant contributions to export earnings. India ranked top in world acreage of cotton and second in production, however, productivity is lower than the world average. Even the yield of cotton in China is 2.5 times more than that of India (Table 1). In country cotton is cultivated in three distinct agro - ecological regions (North, Central and South) but approximately 65 per cent of India's cotton is produced on dry land or rainfed situation particularly in states like Maharashtra with highest acreages (Table 2) where hardly 2 per cent area is under irrigations. Also a significant change was observed in the area, production and productivity of cotton in India since 2004-2005 (Table 3).

Table 1

World cotton area, production and productivity 2013-14

Country	Area million ha	Production (million bales)	Productivity (kg/ha)
United States	3.10	13.18	926
China	5.05	32.00	1380
India	11.70	29.00	540
Pakistan	3.00	9.50	689
Uzbekistan	1.28	4.25	720
Brazil	1.10	7.40	1465
Turkmenistan	0.57	1.50	568
Australia	0.41	4.10	2151
Turkey	0.33	2.25	1484
Egypt	0.13	0.45	754
world	33.14	116.67	766

Source: World cotton USDA services

Spread of cotton technologies

There has been criticism that the results of cotton research did not reach the farmers in time. In cotton

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crop the technologies are spread through extension personnel of the Agriculture Department during last 65 years has mainly been conventional. 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 since large section of farmers do not have access to huge knowledge base available with research system due to lower ratio of farmer to extension worker (approximately 1000:1). Moreover, dissemination of cotton technologies through modern Information and Communication Technologies (ICTs) approach was not taken up anywhere in country though ICTs have the potential to increase the reach of agricultural masses, to speed up the diffusion of requisite information at right time to right people.

Table 2
State wise cotton area, production and productivity 2013-14

State	Area lakh ha	production (lakh bales)	productivity (kg/ha)
Punjab	5.05	18.50	706.93
Haryana	5.66	20.00	690.81
Rajasthan	3.03	12.90	785.48
Gujarat	26.91	116.80	758.08
Maharashtra	38.72	78.25	368.80
Madhya Pradesh	6.21	18.30	520.13
Andhra Pradesh	22.69	69.50	569.41
Karnataka	5.94	20.90	629.63
Tamil Nadu	1.39	2.80	611.51
Orissa	1.34	3.95	507.46
Total	117.27	390.00	565.36

Source: www.cicr.org.in

Table 3
India cotton area, production and productivity for last decade

Year	Area lakh hectares	Production lakh bales	Yield Kgs/ hectare
2004-05	87.86	243.00	470
2005-06	86.77	241.00	472
2006-07	91.44	280.00	521
2007-08	94.14	307.00	554
2008-09	94.06	290.00	524
2009-10	103.10	305.00	503
2010-11	112.35	339.10	513
2011-12	121.78	367.00	512
2012-13	119.78	365.00	518
2013-14*	115.53	375.00	552

Source: Cotton Advisory Board

Use of ICTs in agriculture

In India, information and communication technology (ICT) projects that support successful farming

practices, new technologies or controls of pest and disease outbreaks, and new markets information flows are rapidly growing, with many initiatives in operation today. ICTs essentially facilitate the creation, management, storage, retrieval, and dissemination of any relevant data, knowledge and information that may have been already been processed and adapted (Batchelor 2002; Chapman and Slaymaker 2002; Rao 2007; Heeks 2002). In the past, television and radio were the main electronic broadcast technologies used to reach rural communities, however, in the past two decades, internet- and mobile-based channels have emerged. ICTs now include computer-based applications and other communication tools such as social media, digital information repositories (online or offline) and digital photography and video, as well as mobile phones (Balaji, Meera, and Dixit 2007). However, in agriculture, despite the rapid spread and potential of ICTs to facilitate farmers' access to information, many of the initiatives face common challenges, such as issues of sustainability, affordability, ease of use, accessibility, scalability, and availability of relevant and localized content in an appropriate language (Keniston 2002; Dossani, Misra, and Jhaveri 2005; Saravanan 2010).

The way in which ICT projects access, assess, apply, and deliver content may increase the likelihood of ICT use by farmers and thus may become an important factor in a project's success. To address the information needs of farmers, relevant content is a key component of ICT projects. The extent to which content is customized and localized to a farmer's condition influences its relevance. ICT initiatives in agriculture in India handle content management and delivery processes. These include Reuters Market Light (RML), IFFCO (Indian Farmers Fertilizer Co-operative Limited), Kisan Sanchar Limited (IKSL), Lifelines, Digital Green, e-Sagu, and aAqua (Almost All Questions Answered). Although RML, IKSL, and Lifelines all use mobile phones to deliver information, they differ in the services they provide. RML is a private, mobile-based service that sends short-message service messages about market prices, weather and other agro- advisory information to subscribed farmers' phones. IKSL is a value-added service of the cellular service provider Airtel, in partnership with IFFCO that delivers voice messages with some information similar to that sent by RML, but that also operates as a help line. The Lifelines platform is a donor-funded project based on a question and answer (Q&A) interactive voice-

response system, a- Aqua is a start-up company of the Indian Institute of Technology Bombay that works through a Q&A service but on an open online forum. Digital Green is a nonprofits organization that works through a video-based platform that supports the existing extension services of its NGO partners. The e-Sagu platform, a Media Lab Asia project, requires that local staff take digital photos of farmer fields; these photos are then sent to experts who, in turn, provide the necessary expert advice

Increasing use of mobile phone as communication medium

Mobile or smart phones are becoming an essential device for all types of users irrespective of the age group. In India mobile technology has unleashed a paradigm shift in communication medium to reach out to the masses. As per statistics over 970 million mobile subscribers in India, India has emerged as the world's second largest mobile market globally only after China (Ann. 2014). It has been observed that the introduction of mobile phones to Kerala fishermen could decrease price dispersion and wastage by facilitating the spread of information which made the markets more efficient by decreasing risk and uncertainty (Jensen, 2007). Aker (2008) studied the impact of the mobile phone rollout on grain markets in Niger and showed that mobile phone service has reduced grain price dispersion across markets by a minimum of 6.4 percent and reduced intra-annual price variation by 10 percent.

METHODOLOGY

Conceptual framework of 'e kapas' network system

With a view of effective knowledge transfer and researchable feed back in cotton production, a novel extension mechanism 'e kapas' network was initiated by CICR nationally from 2012 under Technology Mission on Cotton, Mini Mission I. 'e kapas' essentially refers to the utilization of information and communication technologies (ICTs) for delivering cotton based technologies to farmers, extension workers and other development workers engaged in cotton system.

The most obvious benefit of 'e kapas' is to improve the efficiency of the current system so that it can save money and time in comparison to manual systems. It is the 'anywhere and anytime' availability of cotton technologies and services to users. By connecting the cotton growers nationally through e-kapas network, timely and relevant information with regard to cotton

technology will be disseminated in swift manner. Warning and alert services will be issued to the registered cotton growers for taking proactive measures.

The conceptual framework used in this paper, the information chain starts from the content itself, which flows to the ICT platform and eventually to the user (Figure 1). Characteristics influence the activity at each place requires sourcing and storing centre wise data base to access, assess, and adapt that content so that it 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. The users must have the capacity and resources to be able to access, assess, apply, and act upon the information provided by the project. Ultimately, the goal is to develop and manage useful content that users can then act upon.

The programme designed to cover more than 10000 farmers across the cotton growing Districts through mobile- based advisory services. Establishing 'e-kapas' network centre at MPKV, Rahuri the sub centre. The message/advisory is provided on a regular basis on registered mobile number of cotton growers and reaching the farmers by ICT tool of mobile technology.

RESULTS AND DISCUSSION

Cotton Improvement Project, MPKV, Rahuri initiatives to reach cotton farmers of Western Maharashtra through mobile technology

This section discusses the initiatives taken by the sub centre Cotton Improvement Project, MPKV, Rahuri in reaching cotton farmers of Western Maharashtra region of Maharashtra state through mobile technology. Through registration of farmers, development of voice messages and its recording, delivering of messages to registered growers the project has succeeded in implementing ICT module of voice-based system targeting farming communities in regions. The initiatives have started from April 2015 as indicated below.

Data base of cotton growers as 'e- kapas' beneficiaries

Since the voice messages and SMS are to be delivered to the registered farmers free of cost, initiated registration of potential and interested farmer's as beneficiary of e-kapas network with their names, mobile numbers, villages and districts from March

2015 from all districts spread over Western Maharashtra region. Around 9640 farmers from major cotton growing districts including more than 2000 farmers from Ahmednagar, Dhule and Jalgaon districts have registered themselves as e-kapas beneficiary after publicity through few newspapers, farmers attending Mela/Agril Expo, etc. The details of the registered beneficiary cotton growers are being developed into a database called e-kapas farmers' database

FAQs (Frequently Asked Questions) on cotton

The information on recent FAQs (Frequently Asked Questions) was collected through Focus Group Discussion and Kisan Call Centres (KCC) in Marathi language of study areas located at centre. The information needs of farmers with regards to cotton were studied and identified as suitable cotton cultivars, weed management, nutrient management, new technologies, pest and diseases management, market information, weather forecasting, farm machineries and tools, price, government schemes and farm credit information as expressed by the farmers. Content was developed in local Marathi language as a popular dissemination material. The information system based on frequently asked questions of the cotton growing states in all local languages are being developed into a database of FAQs aiming to provide instant solutions to the farmer's problems.

Development of messages, advisories and recording of Voice Messages

Agricultural knowledge is highly time-sensitive and contextual. Information needs and appropriate response vary with the growing season, geographic location, soil conditions dealing with specific crops. The contents of voice messages were developed in local Marathi language including land preparation, package of practices of cotton, pest and diseases and their control, IPM, weather, etc.. During the period around fifty messages and advisories prepared in Marathi on cotton production and protection technologies for empowering farmers with latest knowledge. Noise free, short length, meaningful and timely messages were then recorded from scientist voice for its timely delivery to registered farmers.

Information delivery through mobile based voice system

To tap a vast potential of mobile communication medium, CICR has introduced a voice based cotton

advisory services to the registered farmers through mobile technology. CICR has implemented the mobile services tool through identified service provider UNICEL Technologies, based in Bangalore and founded in 2003, provides Integrated Cloud Communications Solutions across SMS, Voice, USSD, and Email and reaches to the users by delivering around 597410 voice messages to the registered farmers of Western Maharashtra region of Maharashtra. The voice messaging service acts as an automatic voice dialer which sends the recorded messages in the form of automatic phone calls to the registered farmers. This service was provided to all farmers irrespective of telecom network. A total 75 contents voice messages and advisories on cotton were pre-recorded from voice and sent to the registered farmers on their mobile phones in the local Marathi language on a range of topics during the crop season (April-October, 2015) as indicated in Table 4. The system was adopted in case the phone is engaged or outside the coverage area when the voice message is sent, the calls to be 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

Table 4
Subject areas of messages and advisories delivered on cotton in Western Maharashtra region of Maharashtra

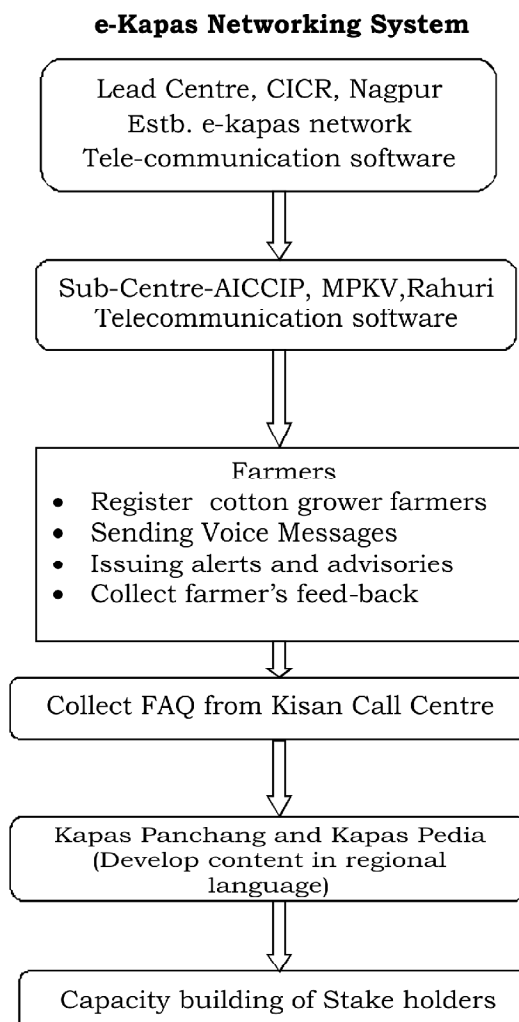
S.N	Subject area of cotton advisories/messages
1	Land preparation and ploughing
2	Seed treatment
3	Varieties/hybrids for early sowing/early maturing in rainfed condition
4	Sowing and Planting distance
5	Fertilizer basal application
6	Drip irrigation in cotton
7	Thinning and Gap filling
8	Use of trap crops
9	Intercultural operations
10	Draining out excess water from fields
11	Top dressing of fertilizers
12	Foliar spray to overcome drought
13	Identification and conservation of natural enemies
14	Foliar spray to recover from the effect of water logging
15	Foliar spray for shading of squares and flowers
16	Foliar spray to ensure proper Cry1Ac expression
17	Foliar spray to overcome micronutrient deficiency
18	Foliar spray to overcome 2-4-D effect
19	Irrigations in Bt cotton
20	Control of sucking pests
21	Control of blight disease
22	Control of wilt disease
23	Control of bollworms and other pests
24	Use of pheromone traps/ IPM in cotton
25	Pickings and drying
26	Storing, marketing
27	Bt cotton and concepts

service is highly accepted by them as it alleviates the language barriers of visual communication. Timely and relevant advisory issued on need of draining out stagnated excess water from the fields due to continuous rains helped most of the farmers since several farmers call back to appreciate CICR efforts. 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.

CONCLUSIONS

Presently, information on cotton crop has been passed to farmers through department of Agriculture and the coverage of extension services is inadequate. By connecting the cotton growers through e-kapas network extension model, timely and relevant information with regard to cotton production and protection is disseminated to the registered cotton growers promptly. Warning and alert services issued to the cotton growers for taking proactive measures through mobile based voice services helped in bringing a change in the perspectives of farmer about cotton cultivation. Farmers have been connected with research institutions for updating about latest technologies and responding their queries immediately by the scientists. During short span of time farmers from the region have been benefited from e-kapas facilities of CICR. Network of registered cotton farmers through e-kapas project in a country would certainly help in intensive pest monitoring, overcoming pest epidemic situation through quick advisory services issued directly to farmers in vernacular languages (weather, production technology, market, new introduction and price) in cotton growing states. Farmers received voice messages reported that information was highly relevant and timely. They were happy that service is relevant for people who are not on the internet or not comfortable with text messaging. The spoken message service can be a boon to farmers in distant areas. This will be of a great use to illiterate farmers who are not technologically equipped thus leading to better involvement and participation. Many farmers appreciated timely release of messages for better application of techniques. Farmers also expressed their willingness to pay for such services if it would save their time and money.

Thus using modern ICTs and establishing a strong linkages between research and technology 'e-kapas' system play a vital role in creating and sustaining



significant changes in the productivity and profitability.

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