Effectiveness of extension education module for sustainable cotton cultivation in India

N. SRIRAM, R. ANNAMALAI, K. RAMAMOORTHY, R. NETAJI SEETHARAMAN AND V. RAVICHANDRAN

Dept. of Agrl. Extension, Tamil Nadu Agrl. University, Coimbatore - 641 003, Tamil Nadu.

Abstract : To increase the cotton area, production and productivity, India has introduced various development programmes in cotton over the period. But the production and productivity are in stagnation stage only. It may be due to lack of knowledge, skill and adoption behaviour among the farmers. To increase the above three domains the present study on developing extension education module for sustainable cotton cultivation in India was carried out to fulfill the national goal. The Study was conducted at Salem district of Tamil Nadu with sampling size of 216 respondents. Multiple randomized group design was used in this experimental study. Three extension education modules were tested among the selected respondents by using various combinations of extension methods. Well-structured and pre-tested questionnaire was used for evaluating knowledge gain, skill related to knowledge gain and symbolic adoption behaviour of the farmers. It was found that lecture assisted with slide show + demonstration + discussion forum were effective in terms of imparting knowledge, knowledge related to skill, and adoption behaviour in cotton cultivation. Finally developed extension education module cultivation was proposed to the farming community for achieving sustainable cotton cultivation in India.

Key words: Knowledge gain, Knowledge gain related to skill, Symbolic adoption behaviour, Cotton cultivation.

Introduction

Cotton is one of the major commodities, which contributes to the economic upliftment of a developing country like India. It offers employment to nearly 900 thousand workers in various textile industries, besides it provides jobs to over 2 to 5 million people in decentralized sectors consisting of power looms, hand looms, charkhas etc. In the world cotton trade of 6 million tonnes, India's share was only 0.25 million tonnes in 1996-97. Though India had the largest area under cotton in the world, it ranks third in production because of its poor productivity of 329 kg of lint per hectare as against world average of 600 kg ha^{-1}. Comparing Pakistan with a productivity of 682 kg of lint ha^{-1}, Bangladesh 779 kg ha^{-1} and Israel 1759 kg ha^{-1}, India showed its poor performance. At present, India's production is about 16.8 million bales of cotton as against a requirement of more than 20 million bales. The deficit is made good by supplies from other countries. Therefore, production of more kapas within our country would not only bring the prices down, but would also help to save a substantial sum in transportation. And also in India only 40 per cent of the technology has been adopted by the farmers, other 60 per cent recommended technologies have not been adopted so far due to various reasons. Though we have implemented lot of extension programmes in this line we couldn't achieve the result. Hence this condition necessiates formulating appropriate extension education module relevant to present situation to impart knowledge, knowledge related to skill aspects in cotton cultivation in order to increase the cotton area, cotton production and productivity of our country.

Materials and Methods

Salem District of Tamil Nadu was purposively selected for this experimental study. A sample of 216 respondents from Omalur, Attur and Namakkal taluks were selected through snowball sampling technique as well as by using secondary sources of information. Multiple

group randomized design procedure was adopted in the experiment. Treatments were selected based on the discussion with scientists, extension workers and progressive farmers. There were three treatments and each were replicated thrice. Treatment 1 (EEM- 1) = Lecture + Field Visit + Discussion Forum, Treatment 2 (EEM-2) = Lecture with Slide + Demonstration + Discussion Forum, Treatment 3 (EEM-3) = Lecture + Video + Discussion Forum. Hence three experimental groups i.e., each 72 respondents per taluk were drawn randomly for the experimental study. In each taluk, three extension modules were assigned randomly to selected farmers in this experiment. Before - After technique of measurement was adopted to find out the effectiveness of the extension education modules in terms of knowledge gain, knowledge gain related to skill and symbolic adoption. Based on this methodology the results were obtained and the findings are discussed by using appropriate statistical analysis. The selected farmers were replicated in the following manner.

$$A_1, C_2, B_3 \xrightarrow{t_1} K \xrightarrow{TK^1} K_1 \longrightarrow SA_1 \longrightarrow$$
$$24 + 24 + 24 = 72$$

$$C_3, C_1, B_2 \xrightarrow{t_2} K \xrightarrow{TK^2} K_2 \longrightarrow SA_2 \longrightarrow$$
$$24 + 24 + 24 = 72$$

$$B_1, A_3, A_2 \xrightarrow{t_3} K \xrightarrow{TK^3} K_3 \longrightarrow SA_3 \longrightarrow$$
$$24 + 24 + 24 = 72$$

Total respondents = 216

Where,

K	=	Pre-exposure knowledge
TK^1	=	Treatment 1 through EEM- 1
TK^2	=	Treatment 2 through EEM-2
TK^3	=	Treatment 3 through EEM- 3
K_1 to K_3	=	Post-exposure knowledge level
SA_1 to SA_3	=	Immediate post exposure symbolic adoption behaviour

EEM-1	t_1A_1	t_2C_2	t_3B_3
EEM-2	t_3C_3	t_1C_1	t_2B_2
EEM-3	t_1B_1	t_3A_3	t_2A_2

EEM-1 to EEM-3 = Extension education modules (treatment) 1 to 3

t_1 = Attur taluk; t_2 = Omalur taluk; t_3 = Namakkal

A_1 to A_3 = First group of 72 respondents (3 replications of 24 Nos. each) drawn randomly from the selected taluks

B_1 to B_3 = Second group of 72 respondents (3 replications of 24 Nos. each) drawn randomly from the selected taluks

C_1 to C_3 = Third group of 72 respondents (3 replications of 24 Nos. each) drawn randomly from the selected taluks

After selecting the subjects for each treatment, their initial knowledge level and knowledge related skill and other data regarding independent variables were collected. Then the subjects were exposed to the subject matter (knowledge level/knowledge related skill) through different treatments. The selected extension education modules were employed in Tamil version. Immediately after exposure, the subjects were allowed to participate in the discussion forum with the trainer. This session was followed by the assessment of knowledge and knowledge related skill gained by the subjects. The difference in the knowledge level and knowledge related skill before and after exposure was taken as knowledge and knowledge related skill gained by each subject. The mean knowledge gain and knowledge related skill gain of subjects for each treatment was compared by applying analysis of variance techniques to draw suitable inferences. After the exposure of the subjects to the treatments pertaining to the knowledge and knowledge related skill, the subjects were assessed for the symbolic adoption behaviour.

Table 1. Analysis of variance of knowledge gain between the treatments   (n=216)

Source of variance	Degrees of freedom	Sum of square	Mean square	F
Treatment	2	2181.182	1090.59	
Error	213	6828.213	30.76	35.46**
Total	215	9009.396	40.22	

SEd = 0.83128   CD (P=0.05) = 1.640   CV = 39.29%

** Significant at 0.01 level

Table 2. Analysis of variance of knowledge gain related to skill between the treatments   (n=216)

Source of variance	Degrees of freedom	Sum of square	Mean square	F
Treatment	2	1067.55	533.77	
Error	213	3294.21	14.84	35.97*
Total	215	4361.76	19.47	

SEd = 0.6290   CD (P=0.05) = 1.2409   CV = 42.24%

* Significant at 0.05 level

Table 3. Analysis of variance for symbolic adoption between the treatments   (n=216)

Source of variance	Degrees of freedom	Sum of square	Mean square	
Treatment	2	361.21	180.60	
Error	213	5662.59	25.51	7.08**
Total	215	6023.79	26.89	

SEd = 0.8247   CD (P=0.05) = 1.63   CV = 17.06%

** Significant at 0.01 level

Results and Discussion

1. Relative effectiveness of different treatments in terms of knowledge gain

Analysis of variance technique was applied to find out the relative effectiveness of three different treatments in terms of knowledge gain and the results are presented in Table 1.

It is evident from Table 1 that there existed significant difference in the effectiveness of the treatments in imparting knowledge as indicated by the significant F value at 1.00 per cent level. The relative effectiveness of the three treatments in respect of knowledge gain showed significant difference. The critical difference for the treatments was 1.64. The

nean scores of the three treatments were found
o be in the order of

Tk_2	Tk_1	Tk_3
14.56	11.97	7.05

All the three treatments were effective,
ut distinctly different in terms of imparting
cnowledge on cotton technologies. It could be
)bserved that the Lecture with Slide +
Demonstration + Discussion Forum (Tk_2) was
'ound to be the most effective and superior
)ne to transfer the knowledge. This was followed
)y Lecture + Field visit + Discussion Forum
:Tk_1). Lecture + Video + Discussion Forum
was found to be least effective in infusing
knowledge among peasants.

Tk_2 was found to be the most effective
module compared to that of Tk_1 and Tk_3. Tk_2
:s a combination of four methods, which
:ncluded both projected and non-projected visual
iids. In addition, the involvement of farmers
.n the presentation of subjects and variation
:n the teaching aids used, might have reduced
boredom and fatigue, and increased the re-
ceptiveness of the subject to the idea being
presented. The change in the learning situation
created by combination of aids would have
also contributed greatly to the knowledge gain.
The finding is in line with that of Subramanyan
(1976), Narasaraj (1985) and Karthikeyan
(1997) who reported that combination of four
extension methods was superior one to transfer
of knowledge aspects.

*2. Relative effectiveness of different treatments
in terms of knowledge gain related to skill*

Analysis of variance technique was
applied to find out the relative effectiveness
of the three treatments in terms of knowledge
gain related to skill aspects, and the results
are presented in Table 2.

It is evident from Table 2 that, there
existed significant difference in the effectiveness
of the treatments in imparting knowledge gain
related to skill aspects as indicated by the
significant 'F' value at one per cent level of
significance. The relative effectiveness of the
three treatments in respect of knowledge gain

related to skill showed significant difference.
The critical difference of the treatment was
1.24. The mean scores of the three treatments
were found to be in the order of

Tk_2	Tk_1	Tk_3
10.60	10.33	6.44

All the three treatments were effective,
but distinctly different in terms of imparting
knowledge related to skill aspects on cotton
technologies among the selected respondents.
It could be found that the treatments Lecture
with Slide + Demonstration + Discussion Forum
(Tk_2) and Lecture + Field visit + Discussion
Forum (Tk_1) were found to be the most effective
extension education methods and on par with
each other for transfer of knowledge related
to skill aspects of the farmers. The treatment
Lecture + Video + Discussion Forum (Tk_3)
was found to be least effective in respect of
knowledge gain related to skill aspects in cotton
cultivation. The treatments Tk_2 and Tk_1 were
found to be effective and on par with each
other for transfer of knowledge related skill
aspects. This might be due to the reason of
the above treatments imparting the skill to the
farmers systematically and by employing local
authentic persons in how to do practices and
convince the people with their scientific know-
ledge. Hence the above treatments were found
to be effective. Similar finding was observed
by Selvaraj (1981) who reported that dem-
onstration was effective in imparting
knowledge to the farmers.

*3. Relative effectiveness of the treatments in
terms of symbolic adoption*

The relative effectiveness of the treat-
ments in terms of symbolic adoption behaviour
was found through analysis of variance test
and the results are presented in Table 3.

The above table reveals that the sig-
nificant 'F' value indicated that there was
significant difference between the three ex-
tension education modules in influencing the
symbolic adoption of technologies of cotton
cultivation.

The critical difference for treatments
was observed as 1.63. The mean scores of

the three treatments with respect to symbolic adoption are presented in the order of

Tk_2	Tk_3	Tk_1
32.33	28.79	27.67

All the three treatments were effective and they were significantly different from each other in terms of symbolic adoption. It could be declared that among the three treatments, Lecture with Slide + Demonstration + Discussion Forum (Tk_2) was found to be the most effective method and superior to that of treatments (Tk_3) and (Tk_1) in respect of its effectiveness in terms of symbolic adoption. The treatment Tk_3 was also found to be effective and on par in its effectiveness with the treatment (Tk_1).

It could be revealed that treatment (Tk_2) was found to be effective in terms of symbolic adoption of the technologies by the respondents. The treatment Lecture with Slide + Demonstration + Discussion Forum (Tk_2) was already observed as the best extension education module for imparting knowledge and knowledge related aspects to all types of categories of farmers. So, automatically this module again would have influenced their farmer's behaviour to mentally adopt the cotton technologies. In addition, Demonstration and Slide show convinced the farmers by showing the effectiveness of the various technologies on cotton cultivation lead to increase its yield made them to accept the technologies mentally. Hence, the treatment (Tk_2) was found to be effective and superior one to transfer of technology and effectiveness in terms of symbolic adoption. This finding derived the support from the finding of Sathiyaseelan (1998) who reported that after adequate training, demonstration and slide show, respondents had the highest symbolic adoption behaviour.

Video has been considered as one of the effective methods in terms of symbolic adoption, but it was on par with the treatment, field visit. Earlier video had not been effective in terms of imparting knowledge and knowledge related to skill aspects but it was found to be effective in terms of symbolic adoption of technologies. This might be due to that video had showed the impact of different

technologies followed in cotton cultivation and made the subjects satisfactory and accept the technologies mentally. Hence, the treatment (Tk_1) showed effectiveness in terms of symbolic adoption. This finding is in accordance with the findings of Mruthyanjayam (1987), Selvaraj (1990), Philip (1995) and Karthikeyan (1997) who reported that majority of farmers expressed high symbolic adoption behaviour after viewing the video.

It could be concluded that the treatment Lecture with Slide show + Demonstration + Discussion Forum (Tk_2) was found to be effective in terms of symbolic adoption of technologies of cotton crop by the subjects.

4. Developed Extension Education Module for Sustainable Cotton Cultivation:

The effective extension education modules include various dimensions of training preferred by the respondents. Most of the respondent preferred the training programme on cotton cultivation to be conducted by cotton scientists, progressive farmers, and preferred to get trained in groups. Institutional type of training conducted through lecture with slide and demonstration at Krishi Vigyan Kendra during August-September for a duration of one day will be preferred to get reference book/booklet was preferred by most of the respondents. Based on the present study, the Treatment 2 (T_2) namely Lecture assisted with Slide Show + Demonstration + Discussion forum was found to be effective in terms of imparting knowledge, knowledge related to skill and symbolic adoption behaviour among the respondents in cotton cultivation. Technologies like soil and climate, varieties, seed treatment, land preparation, irrigation management, manures and fertilizers, weed management, pest management, disease management and micronutrient management on cotton cultivation were preferred by the respondents. So in future the above developed module may be followed in all the area with slight adjustment according to the situation and type of respondents.

Conclusions

It could be concluded that cotton is one of the profitable crops among the commercial crops in India. To increase the foreign exchange

ınd income of the farmers, India has to increase he production and productivity in cotton in ırder to meet out the domestic needs as well ıs foreign needs. In order to increase the above ıet. goals, extension agency have to increase he farmers knowledge, skill and adoption ıehaviour in cotton through effective extension nethods. In this study the proven extension :ducation module has developed to disseminate he technologies for sustainable cotton culti-/ation. So the developed extension education nodule may be followed by all the extension gencies in our country for sustainable cotton ultivation.

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