Asian Journal of Agricultural Extension, Economics & Sociology

Volume 41, Issue 7, Page 23-28, 2023; Article no.AJAEES.99326
ISSN: 2320-7027

Utilization Pattern of TNAU Banana Expert System among Nendren Banana Growers in Kanyakumari District

S. Nazreen Hassan [a*], R. Swarna Priya [a], K. Kavitha [a], A. Selvarani [a], R. Latha [a] and S. Suresh [a]

[a] ICAR-KVK, Kanyakumari, Thirupathisaram-629901, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2023/v41i71938

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/99326

Data Article

Received: 01/03/2023
Accepted: 03/05/2023
Published: 11/05/2023

ABSTRACT

Use of Information and Communication Technology (ICT) for transmission of localized information and services has increased towards making farming socially, economically and environmentally sustainable by Digital Agriculture. Tamil Nadu Agricultural University (TNAU) has initiated a lot of efforts in digitizing agricultural information to reach the stakeholders. A few expert systems were developed to help farmers and specialists to diagnose plant diseases. The TNAU Banana expert system is one such mobile app, where a farmer can get all solution and information on banana cultivation in just one touch. An experiment was conducted with 40 banana farmers of Kanyakumari district who form the respondents for the study. This paper analyses on Knowledge gain with the support of the TNAU Banana Expert system, which showed significant positive change. The number of technologies adopted above the average adoption level after demonstration was eleven. It was adopted by only 12.5% of farmers before using the App, while it was 62.5% after the demonstration. The overall increase in Knowledge gain over the existing level was 53.05%.

**Corresponding author: E-mail: najuhassan@tnau.ac.in;*

Keywords: ICT; Nendren banana; plant diseases; technologies.

1. INTRODUCTION

Rural India is drastically moving towards digitalization and technology in agricultural development. Singh et al. [1] stated that timely information and practical solutions of the agricultural problems helps the farmers to adopt good agricultural practices, make better choices of inputs and to plan the cultivation properly. Use of Information and Communication Technology (ICT) for transmission of localized information and services has increased towards making farming socially, economically and environmentally sustainable by Digital Agriculture. The recent advancements in Phone Technology have brought great opportunities to ride over or, 'leapfrog' the costly and redundant technologies that the smallholder farmer could not have afforded otherwise. Trends in digital usage show that India is the third largest smartphone user after China and USA which hovers around 167.9 million in 2015. Tetty [2] in a study conducted Ghana found that the use of the mobile phone has improved customer relation, enhanced communication with suppliers, extension officers and customers, and it has also increased farmers profit. The study proved challenges such as inability to have access to calling cards regularly, fluctuation in network receptions and constant energy to charge their mobile phone for rural agriculturalists. Even though all information is available on public domain, it is a very tedious task to farmer to access it. The application of ICT could harmonize data between suppliers and clients and also enhance decision making process. Moreover, it could facilitate the exchange of supply and demand information between farmers and entrepreneurs [3-5].

Syiem and Raj [6] reported mobile as the most frequently used ICT tool. Major problems faced by the farmers were lack of confidence in operating ICTs, erratic power supply, low network connectivity and lack of awareness of the benefits of ICTs. De Silva and Ratnadiwakara [7] have stated the possibility of dramatic reductions of transaction costs with the use of ICT. This was due to the reduction in information search costs to enable greater farmer participation in commercial agriculture as opposed to subsistence farming that continue to force so many farmers in developing countries in to poverty.

Mobile or Smartphone apps revolutionized the connectivity and is used for transferring personalized agri-information to farmers. Smartphone applications in the form of mobile apps have changed the agricultural information scenario to a greater extent. TNAU has initiated a lot of efforts in digitizing agricultural information to reach the stake holders at a faster rate. A few expert systems were developed to help farmers and specialists diagnose plant diseases. The TNAU Banana expert system (TNAU BES) is one such mobile app, where a farmer can get all solution and information on banana cultivation in just one touch.

1.1 TNAU Banana Expert System (TNAU BES)

Farming apps are the most convenient and useful medium to guide farmers in farming. It gives the guideline for doing farm operations in proper scientific way in crop cultivation, sowing or harvesting of any crop. This digital change is acting as a game-changer for Indian agricultural conditions. Farmers can easily solve their farming problems related to pest or insect attack or any problems which can otherwise put them in a difficult situation. TNAU BES is one of the seven apps developed for the benefit of the farming community. TNAU BES is a mobile app which can enhance productivity in banana. It is a cheapest information source with quick access and personalized in nature. The utility in information is the content and the mandate of creation of this app. Most of the apps are useful only for specific information while others are multi-informant. This app is a helping boost in reducing negative environmental impacts of farming and in increasing production. It helps to diagnose field problems and provides solution to the problems. It serves as a decision support system as well as an information repository with respect to banana cultivation. A farmer with android mobile phones can access this app and get benefitted with many useful information on agricultural activities.

2. METHODOLOGY

The study was conducted in Kanayakumari district of Tamil Nadu. Forty farmers from two blocks, namely Thuckalay and Thovalai, with maximum area under Nendren banana was selected as respondents of the study. All these farmers had accessibility to android phones.

Training was provided and farmers were facilitated to download the TNAU BES in Tamil. Hands on skills in utilizing the app were provided to the banana farmers. A knowledge test was conducted before and after exposure to BES with two months' time interval to assess the effect of the intervention on the mobile app provided to farmers. This time interval enables to assess the usage of the app on continued basis. A knowledge test was conducted based on semi-structured questions on selected recommended farm operations. The change in Knowledge gain was assessed using paired t test. Symbolic adoption for usage of BES was administered immediately after downloading the app in the mobile phones of banana farmers.

3. RESULTS AND DISCUSSION

Nendren is a predominant banana variety grown in Kanyakumari district. It is used traditionally for table purpose and for chips making. At present it has been extensively used for value addition with banana powder, banana fibre from pseudostem and for making chips at different staged of fruit. Hence, Nendren has large market value and great export potential. Despite trainings and demonstrations, the farmers shown lacking in practicing appropriate technologies at field level. With the intervention of utilization of TNAU BES, a change in knowledge has been observed and it is detailed below [8-10].

Knowledge on 15 farm operations was recorded before intervention and two months after the intervention was provided on the farmers. The Table 1 denotes that 77.5 percent of farmers had known desuckering stage of Nendren banana and 70 percent had known the varieties suitable for Kanyakumari district. After the intervention was provided, it was observed that maximum Knowledge gain was seen in knowing the symptoms of Calcium deficiency. The district is a high rainfall zone with soil pH ranging from 6.5 to 7.5. Symptoms of Calcium deficiency was earlier the least known to the farmers prior to introduction of the TNAU BES app. Value addition is another emerging sector which attracted the rural youth in the recent years. Only as an example, an increase of 105.88 percent in knowledge was observed in value addition aspects of banana (Table 1).

Paired t test shows that:

Paired sample T-test, using T (df:39) distribution (two-tailed):

1. H_0 hypothesis

Since the p-value < α, H_0 is rejected.

The After population's average is considered to be not equal to the Before population's average. In other words, the sample difference between the averages of After and Before is big enough to be statistically significant.

2. P-value

The p-value equals **0.000619**, (P (x≤3.724) = 0.9997). It means that the chance of type I error (rejecting a correct H_0) is small: 0.000619 (0.062%). The smaller the p-value, the more it supports H_1.

3. Test statistic

The test statistic Tequals 3.724, which is not in the 95% region of acceptance: [-2.0227, 2.0227].

The 95% confidence interval of After minus Before is: [1.599, 5.401].

4. Effect size

The observed effect size d is medium, 0.59. This indicates that the magnitude of the difference between the average of the differences and the expected average of the differences is medium.

The results show that there is highly significant change in knowledge among the farmers who have used the technology.

3.1 Overall Change in Knowledge and Expression of Symbolic Adoption

Farmers in the district traditionally follow the practices prevalent in the area and the knowledge departed to them by their ancestors. Farmers' reaction after exposure to this ICT enabled service to be recorded in the form of symbolic adoption expressed by them.

Symbolic adoption of the app was given by 37.5% of the farmers before demonstration and 67.5% after demonstration. Out of the 15 selected technologies, the number of technologies adopted above the average adoption level of 11 technologies was adopted by 12.5% of farmers before using the App while it was 62.5% after demonstration. The overall increase in Knowledge gain over the existing level by farmers not willing to use the app was 24.17%.

Table 1. Knowledge gain with the support of TNAU BES

S. No.	Particulars	Knowledge Gain				Percentage change from existing Knowledge in each item (%)
		Before App		After App		
		Nº	Percent (%)	Nº	Percent (%)	
1	Variety suitable for Kanyakumari	28	**70.00**	38	**95.00**	35.71
2	Selection of suckers	21	52.50	32	80.00	52.38
3	Method of planting	19	47.50	22	55.00	15.79
4	Seed Rate	14	35.00	26	65.00	**85.71**
5	Spacing for Nendren	15	37.50	27	67.50	**80.00**
6	Sucker treatment	16	40.00	20	50.00	25.00
7	Variety for culinary purpose	23	57.50	39	**97.50**	69.57
8	Fertigation benefits	17	42.50	32	80.00	**88.24**
9	Micronutrient application	11	27.50	17	42.50	54.55
10	Symptoms of Calcium deficiency	5	12.50	11	27.50	**120.00**
11	Prolinge	21	52.50	23	57.50	9.52
12	Desuckering stage	31	**77.50**	36	**90.00**	16.13
13	Pseudo stem weevil control	14	35.00	27	67.50	**92.86**
14	Sigatoka leaf spot identification	10	25.00	16	40.00	60.00
15	Value addition in banana	17	42.50	35	**87.50**	**105.88**
	Knowledge gain on average:					**53,05%**

Table 2. Overall change in knowledge and expression of symbolic adoption

Particulars	Symbolic Adoption	
	Nº	(%) *
Before intervention	15	37.5
After intervention	27	67.5

**Percentage over the total responders (40)*

Table 3. Perception of farmers on relevancy of banana expert system

N=40

S. No	Farmers perception about TNAU BES	Nº	Percentage
1	Repetition to retrieve is possible	40	100.00
2	Language is simple	39	97.50
3	Accessible to related agricultural information	38	95.00
4	Easy to use	38	95.00
5	Updated Information available	35	87.50
6	Helps in getting relevant information	34	85.00
7	Content is adequate and complete	33	82.50
8	Timeliness of the messages available	29	72.50
9	Effective in solving farmers need and problems	27	67.50
10	Helps in information on value addition	26	65.00

3.2 Perception about Relevancy to the Need of TNAU BES

Farmers' perception about the relevancy of TNAU BES to the technological need of banana farmers in the district was assessed. The results are given in Table 3.

Perception on repetition in retrieval (100%) was given by all respondents. Farmers can easily understand due to simple local language (97.5%). Accessibility and ease to use was expressed by 95% of the respondents. Information on Value addition was given at least by 65% of farmers, as the information provided was less adequate and not individualistic.

4. CONCLUSION

The expert system developed for banana by TNAU can be used to provide farmers with reliable information on integrated crop management, integrated nutrient management and integrated pest and disease management, thereby promoting a more remunerative agriculture development. The study depicts that the farmers utilizing this mobile app are more efficient in diagnosing field problems in banana. The extension workers can demonstrate and train the farmers in using this mobile app. Both central and state governments are focusing in augmenting ICT applications in Agriculture. This expert system created by TNAU could improve the knowledge in new production technologies by the farmers, which can in turn enhance their income. The future of agriculture lies in digital transformation. Efforts made have to be spread to grass root levels to make the mission of deliverance more successful.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Singh S, Ahlawat S, Sanwal S. Role of ICT in agriculture: policy implications. Orient. J Comput Sci Technol. 2020;10(3).
2. Tetty C. The use of the mobile phone in a Farmer's business. Int J Acad Res Bus Soc Sci. 2013;3(9):156-64.
3. Kale RB, Rohilla PP, Meena MS, Wadkar SK. Information and communication technologies for agricultural knowledge management in India. J Glob Int J Comput Sci Math Theor. 2015;3(1) 2017:16-22. ISSN 2545-5699, 8(1).
4. Ramli SA, Samah BA, Hassan MS, Omar SZ, Bolong J, Shaffri HAM. Potential benefits of ICT for youth agro-based entrepreneurs in Malaysia. J Appl Sci. 2015;15(3):411-4.
5. Singh V, Sankhwar S, Pandey D. The role of information communication technology

(ICT) in agriculture. Glob J Multidiscip Stud. 2015;3(4).
6. Syiem R, Raj S. Access and Usage of ICTs for Agriculture and Rural Development by the tribal farmers in Meghalaya State of North-East India. J Agric Inform. 2015;6(3):24-41.
7. De silva H, Ratnadiwakara D. Using ICT to reduce transaction costs in agriculture through better communication: A case study from Sri Lanka. LIRNEasia, Colombo, Sri Lanka; 2008.
8. Almadhoun HR, Abu-Naser SS. Banana knowledge based system diagnosis and treatment. Int J Acad Pedagog Res (IJAPR). 2018;2:1-11. ISSN: 2000-004X
9. Nivedha CK, Karthikeyan C. Utilization of banana expert system app and its effectiveness on farmers in Tirunelveli District of Tamil Nadu. The Andhra Agric J. 2020;67(Spl. II):44-8.
10. Available:https://agritech.tnau.ac.in/expert_system/banana/index.html

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/99326