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Dr. KC Siva Balan
Training Assistant (Agrl. Extension), Krishi Vigyan Kendra, Tamil Nadu, India

Dr. MR Latha
Programme Coordinator, ICAR - Krishi Vigyan Kendra, Tamil Nadu, India

Dr. N Anandaraja
Programme Coordinator (i/c) ICAR - Krishi Vigyan Kendra Pongalur, Tiruppur, Tamil Nadu, India

Corresponding Author:
Dr KC Siva Balan
Training Assistant (Agrl. Extension), Krishi Vigyan Kendra, Tamil Nadu, India

Impact assessment of various extension methods in knowledge gain among coconut growers

Dr. KC Siva Balan, Dr. MR Latha and Dr. N Anandaraja

Abstract
Among the 138 million farm holdings at national level, around 85 per cent belongs to small and marginal farmers and their performance is indispensable for ensuring food security. That's why the extension system had played its role in transfer of production-oriented technologies and yielded self-reliance in food production. The agricultural information plays a pivotal role from sowing to marketing phases of farming and there by accelerates agricultural productivity, farm profitability and in turn leads to better rural livelihoods. In this context, the ICT tools have tremendous potential to facilitate technology transfer to the individual in remote corners of the country. The present study was conducted among coconut growers to assess the impact of various extension methods in imparting crop cultivation knowledge.

Keywords: Extension methods, Coconut growers, TNAU and Mobile expert apps

Introduction
In the present-day Indian agriculture, declining of the natural resources, escalating production cost, distancing of technology divide and more specifically the declining farm returns leads to a complex situation of rural disillusionment. At individual level, the farmers unrealizing remunerative prices for their produce look for alternative livelihood activities or even ready to quit farming. To assist the farmers in technology adoption and facilitating transfer of technologies, public extension system has evolved over time and had recipe of success during green revolution era in India. Due to liberalization of markets and globalization, the needs of the farmers gone well beyond production line. Claire *et al.* (2010) reviewed some of the agricultural extension approaches currently in India and reported that farmers face a lot of difficulties in getting timely, reliable, and relevant information. The inadequate service coverage of farmers, high transactional costs, competency of extension agents are the other unresolved issues. The ratio of staff to farmers varies widely across the country (1:300 in Kerala, 1:2,000 in Rajasthan). At the same time there are duplications of initiatives and efforts, with multiple agents attending to extension work without adequate coordination.

Usually the farmers' practice would be seeking advice from the relatives and friends which requires time and man power as well as travel. The information authenticity is also a prime issue in farmers practice. In most developing countries, information search costs constitutes around 11 per cent of the total cost incurred by farmers during the agricultural cycle, starting from the sowing decision to marketing of produce. There exists a wide range of modern gadgets such community radio broadcasts, computer-based information and decision support systems, community video programmes, touch screen kiosks, interactive voice response systems and mobile messaging systems.

Through ICT tools, people in rural areas can connect with the local, regional and national economy and access markets, financial services and also farm based services.

With increasing mobile ownership of 969.89 million in India (TRAI, 2019), Mobile technology has many more advantages such as personalized information sharing, instant delivery of message, mobility of devices and cheaper cost for deployment than any other ICT devices such as computers, Internet etc. The mobile enabled extension approach is the subset of m-Agriculture (Mobile agriculture) which is a of e-Agriculture, referring to the delivery of agriculture-related services via mobile communications technology. Mobile technology tools includes all kinds of portable devices like basic mobile phones, smart phones, Personal Digital Assistances (PDAs) or tablet devices (e.g. iPad). Though several studies have demonstrated the potential of mobile phones in improving the capacity of farmers to cope with agricultural risks, many others (Mittal, S and M. Mehar, 2012; Fafchamp & Minten, 2011) have questioned its real impact on farmers. Bachhav (2012) [3] revealed that 40.58 per cent of farmers require daily information for various agriculture works. The farmers use multiple sources of information because no one source gives them a complete information (Mittal, 2013) [5] It was also found that the mobile phone usage by farmers can reduce the information search costs, thereby dramatically lowering transaction costs and enabling greater farmer participation in commercial agriculture (de Silva and Ratnadiwakara, 2008) [4]. The imbalance of fertilizer application dose differs from one farmer to another thereby input costs are escalating. The farmers are unaware about the pest and disease-causing agents and unable to take control measures of their own. Thus the farmers hardly depend on self-decisions and personal contacts for decision making on coconut cultivation.

Coconut cultivation

Considering the versatile nature of the crop and the multifarious uses of its products, coconut palm is eulogized as KALPAVRIKSHA (Tree of Heaven). Coconut is a source of food, beverage, medicine, natural fiber, fuel, wood and raw materials for units producing a variety of goods. Coconut is also interlinked with socio economic life of large number of small and marginal farmers in the peninsular India. It is estimated that about 12 million people in India are dependent on the coconut sector in areas of cultivation, processing and trading activities. With an annual production of around 17,000 million nuts, coconut contribution to nation's GDP is about 15,000 crores rupees. In Pudukkottai district, Coconut is grown in 9387 Ha. The coconut growers are unable to find the deficient in Micronutrients so that considerable yield loss occurs

Methodology

Simple random sampling techniques used, to collect data from selected three blocks in Pudukkottai district in Tamil Nadu. The target group of 30 members was installed with TNAU coconut Expert system mobile application was compared with non-users. TNAU mobile app-based Coconut expert system was launched in 2017 and could be freely downloaded from Google Play store. The technology wise gain over extension methods was also documented. Pretest and post test was conducted to record the knowledge gain by all the extension methods. Percent analysis was used to interpret the results. The different methodologies chosen were as follows,

Farmers practice: Farmers usually see farm related advice from relatives and friends. They tend to visit the input dealer shops also to get the information on management practices. This involves considerable time and travel costs.

Technology 1 Extension Leaflets: The leaflets and folders on Coconut cultivation (with package of practices) was distributed to the farmers.

Technology 2 TNAU Agritechportal: The farmers were taught with navigation to TNAU Agritechportal and how to get Coconut crop production details.

Technology 3 TNAU Coconut Expert system Mobile application: The farmers using android phones were installed free with TNAU Coconut Expert system.

Results and Discussion

The public and private extension systems are innovating approaches for the transfer of technology and information to farmers so as to empower them to face the challenges of liberalization and globalization. Today the farmers are gradually looking for frequent interaction with various information sources not only to carry out their farming marketing tasks efficiently but also to ensure delivery of safe and quality agricultural products to consumers. Adoptions of information by farmers have greater influence mainly due to easy and convenient access to these sources (Adhiguru P et.al, 2009) [1]

The partial budgeting analysis is the direct measure of economic impact by using mobile application services. The partial budgeting analysis was done for Coconut growers using TNAU Coconut Expert system mobile application. The results of partial budget analysis for Coconut are presented in Table 1.

Table 1: Coconut - Cost and return analysis among Users and Non-Users

Costs / Returns (Rs/Acre/Yr)	Users	Non-Users
Information searching cost/ Internet charges	1200	500
Seedling and transplanting cost	7,000	7,000
Agro inputs cost	16000	19000
Irrigation and weed cost	6000	6000
Labour charge	5000	5000
Yield (Nuts)	5000	5000
Selling Price (Rs/ /Kg)	10	8
Others costs (like refreshments / food etc.)	0	300

Though the mobile application services are free of cost for farmers, they have to recharge for internet connection periodically and might check the details with extension functionaries. Thus farmers may incur mobile call charges. Meanwhile, the non-users have to travel to nearby markets to get information there by incurring transportation and food expenditures for every trip. The non-users also spent Rs.300 for refreshments, food etc, during their travel.

Table 2: Partial budgeting analysis

S. No.	Debit (A)	Value	Credit (B)	(Value)
1	Added Costs		Reduced Costs	
	Net renewal charges	1,200	agro chemicals + other costs	3300
2	Reduced Returns		Added Returns	
	-	Nil.	Price of the commodity (@ Rs.2 (higher) for 5000 nuts)	10,000
	Total	1200	Total	13,300
Net Gain = (B – A)				12,100

The timely plant protection measures are possible by using mobile application thereby saving agro input costs to the tune of Rs.3300 per acre.

Technology wise knowledge gain

A well-structured questionnaire with questions falling from land preparation to coconut harvesting and value addition was prepared to test the knowledge level gained before and after the technology intervention. From the pretest and post-test assessment (Figure 1) it was evident that only meager knowledge gain (2.5%) was found in the category of farmers using farmers practice for agricultural information. The extension materials such as leaflets capitulate 9 per cent increase in knowledge level since the extension materials could be a regular study material for the respondents. The farmers used Agritechportal showed 12 per cent of increase in knowledge gain. The free laptops given by the state Government for the school children and use of mobile internet might be reasons for frequent use of Internet and thereby use of TNAU Agritechportal usage. Interestingly 24 per cent increase in knowledge gain was found among the TNAU Coconut Expert system mobile app users. The reason might be Mobile as a handy tool could be used whenever need of information arises.

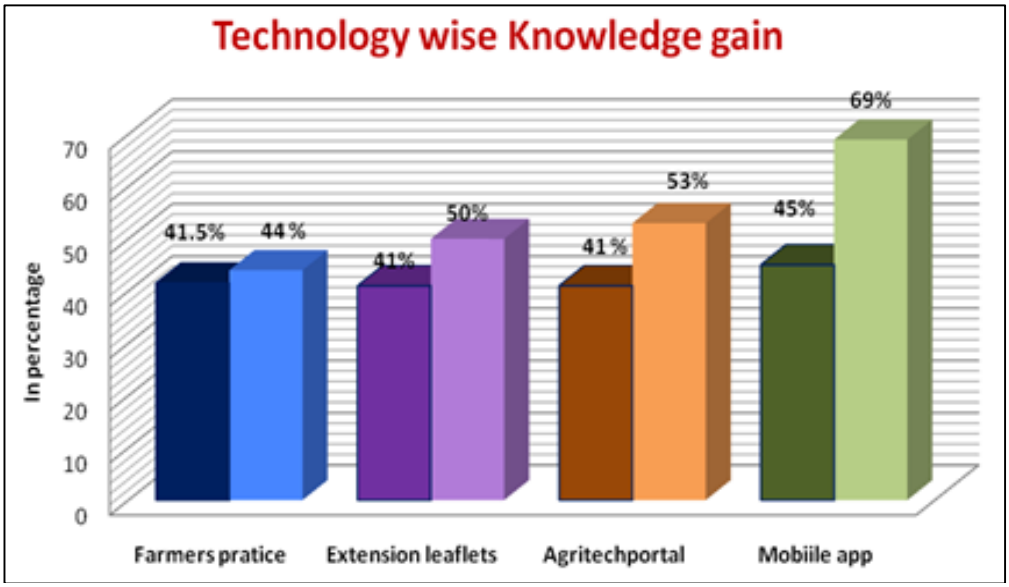

Fig 1: Technology wise Knowledge gain

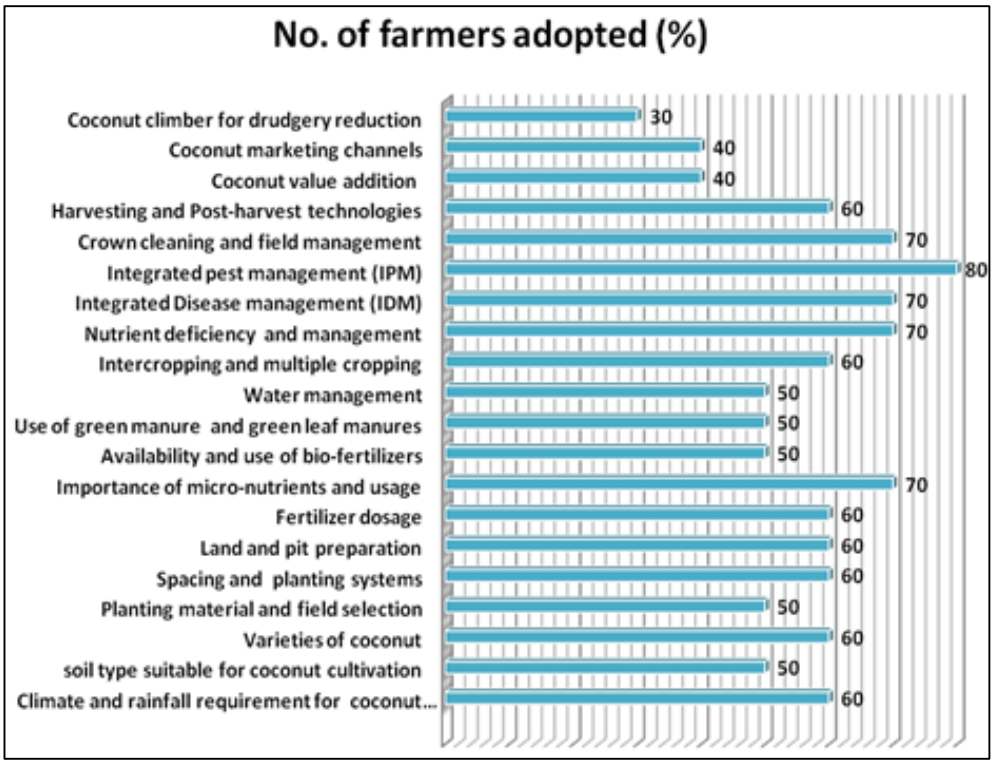

Fig 2: Perception adoption of cococnut cultivation technologies

Perceived adoption of coconut cultivation technologies by coconut growers

The coconut expert system mobile application users were enquired in the line of technologies adopted as suggested in the mobile application. The integrated pest management measures were followed by vast majority (80%) of the respondents. Since the pest management is crucial in coconut cultivation, the farmers are interested in checking the pest symptoms and following the IPM measures. The disease management, nutrient management in coconut farms are directly implies with yield. The timely action could save much input cost and in turn increases profitability. The

majority of the respondents (70%) perceived that by referring with the mobile application, it was possible to adopt nutrient management and disease management practices in time. From the study, it was also inferred that the farmers were interested in receiving advisories which could serve as reminders on seasonality basis.

Conclusion

With ever-increasing trend of android mobile ownership and mobile based internet users, Mobile interventions could be a better alternative for technology transfer and capacity strengthening. The farmers could better informed by using the mobile application without any time constraints. Though web based technology are delivering all round information, the farmers are facing difficulty in operating computers and searching information. The extension reading materials have to be preserved so as to check during the operations. Being mobile as 24 X 7 info tool, the farmers could check whenever they need of information. Even they could share the information to the fellow farmers through social networking sites such as Whats App etc. This ready reckoner or handy tool could help in identification of nutrient deficiency symptoms as well as pest and disease infection symptoms (K.C. Sivabalan, 2015) [6]. For advisories, in the mobile application, season, stage of the crop and standard advisory practices could be value added (Like fertilizer calculator). The advisories could be based on pay and use terms instead of free user terms for more efficient technology transfer. Thus the mobile interventions have the potential to realize better price margin as well as to reduce the direct cost in every stage of the crop value chain.

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