

Research Application Summary

The effectiveness of Video mediated learning and farm demonstrations on the uptake of improved sorghum technologies in Embu County, Kenya

Chimoita, E.,^{1*} Onwonga, R.² & Okry, F.^{3,4}

¹Department of Agricultural Economics, University of Nairobi, P.O. Box 30197, GPO, Nairobi, Kenya

²Department of Land Resource Management and Agricultural Technology, University of Nairobi, P.O.Box 30197, GPO, Nairobi, Kenya

³National University of Agriculture, Porto Novo, Republic of Benin

⁴ Access Agriculture, Cotonou, Republic of Benin

*Corresponding author: echimoita2011@gmail.com

Abstract

There exists an emerging and yet unexploited video mediated learning extension platform capable of disseminating agricultural technologies fast to farmers within and without the technological implementation site. A study was conducted to compare the effectiveness of agricultural video mediated learning tools and farm demonstrations approach in the implementation of selected improved sorghum technologies in Embu County, Kenya. A total of 66 farmers were categorized into three groups of 22 each for video mediated learning, farm demonstrations and control for implementing improved sorghum technologies. Primary data were gathered, analyzed and presented by descriptive statistics. The results indicated that majority of the farmers were adults and literate. An evaluation tool was used to determine the uptake and implementation of various technologies. Comparatively, the video mediated learning approach was rated effective in enhancing farmers' uptake and implementation of techniques such as seed selection, planting methods and weeds control, to farm demonstrations approach which enhanced uptake of land preparations techniques exclusively. It was concluded that video mediated learning approach had a high comparative advantage of creating awareness through its audio-visual power by stimulating social learning behavior among the farmers. Therefore video mediated learning tools and farm demonstrations can be used as complimentary approaches by extension agents in cases where resources are limited.

Keywords: Extension approach, demonstrations, information dissemination, Kenya, sorghum, video mediated learning, uptake of improved technologies

Résumé

Il existe une plate-forme de vulgarisation de l'apprentissage médiatisé par la vidéo, nouvelle et encore inexploitée, capable de diffuser rapidement les technologies agricoles aux agriculteurs, à l'intérieur et à l'extérieur du site de mise en œuvre technologique. Une étude a été réalisée pour comparer l'efficacité des outils d'apprentissage médiatisé par vidéo et de l'approche de démonstration à la ferme dans la mise en œuvre de technologies de sorgho améliorées et sélectionnées dans le comté d'Embu, au Kenya. Au total, 66 agriculteurs ont été classés en trois groupes de 22 chacun pour l'apprentissage médiatisé par la vidéo, les démonstrations à la ferme et le contrôle de la mise en

œuvre de technologies de sorgho améliorées. Les données primaires ont été rassemblées, analysées et présentées sous forme de statistiques descriptives. Les résultats ont indiqué que la majorité des agriculteurs étaient des adultes et alphabètes. Un outil d'évaluation a été utilisé pour déterminer l'adoption et la mise en œuvre de diverses technologies. Comparativement, l'approche d'apprentissage médiatisé par vidéo a été jugée efficace pour améliorer l'adoption par les agriculteurs et la mise en œuvre de techniques telles que la sélection des semences, les méthodes de plantation et la lutte contre les mauvaises herbes, à l'approche des démonstrations à la ferme qui amélioreraient l'utilisation exclusive des techniques de préparation des sols. Il a été conclu que l'approche d'apprentissage médiatisé par vidéo présentait un grand avantage comparatif en termes de sensibilisation, grâce à son pouvoir audiovisuel, en stimulant le comportement d'apprentissage social chez les agriculteurs. Par conséquent, les outils d'apprentissage médiatisé par vidéo et les démonstrations à la ferme peuvent être utilisés comme approches complémentaires par les agents de vulgarisation dans les cas où les ressources sont limitées.

Mots-clés: approche de vulgarisation, démonstrations, diffusion de l'information, Kenya, sorgho, apprentissage médiatisé par la vidéo, adoption de technologies améliorées

Introduction

Agricultural extension and information dissemination services in Kenya and most developing countries play a vital role in facilitating technology transfer, productivity and income generating knowledge among farmers (Dixon, 2010). Besides service provision, extension agents from both government and private sector have over the years engaged middle income farmers and resource-poor small scale farmers in disseminating modern technologies and knowledge (Kamau, 2006). Further, extension agents help farmers gain access to relevant information from various sources by evaluating and interpreting information based on farmers' past situations and experiences (Quion *et al.*, 2001). For instance, there has been an increased participation of the private sector extension agents in Kenya as compared to the government extension agents (Munyua, 2010) resulting in enhanced uptake of improved technologies on major commercial crops. As a result of the conflicting interests on commercial major crops, there has been negligence of improved technologies for neglected crops such as sorghum, millet, sweet potatoes and sesame (Kamau, 2006).

Documented evidence shows that there exist improved sorghum production technologies and varieties on research institutions in Kenya and elsewhere in the world (Erbaugh *et al.*, 2010). However, the developed improved varieties and technologies are not reaching the farmers as a result of weak linkages between farmers and extension providers. Moreover, the effectiveness of the government of Kenya extension sector provision has declined greatly during the last decade due to structural adjustment programmes (SAPs) and liberalization policies (Kamau, 2006).

Farm demonstrations are practical based extension approaches which involve a group of farmers and an agent performing on-farm experiments based on conventional guided learning material produced by extension and research agents (Quzon *et al.*, 2001). However,

efficiency on uptake and up-scaling of technologies through farm demonstrations has been hampered by limited resources (Adetumbi, 2013).

To bridge the gap created through conventional extension approaches, agricultural extension sector in Kenya is currently seeking the best ways to maximize adoption of various agricultural interventions through provision of appropriate technologies, knowledge and information to farmers. One promising area is the use of Information Communication Technologies (ICT). According to Adetumbi (2013), ICT tools such as radio, television, videos can be used to present agricultural information in multiple formats that meet the diverse information needs of the farmers. However, there exists an emerging and yet unexploited video mediated learning extension platform capable of disseminating fast agricultural information to farmers worldwide.

Methodology

Study area. The study was conducted in arid and semi-arid lands of Mbeere Sub-county, Embu County, Kenya. The area is largely a low agricultural potential zone with minimum rain-fed conditions. However it is suitable for food crops such as maize, millet, sorghum, beans, cowpeas, green grams, cassava and bananas mainly under subsistence farming.

Study Description. A total of 66 farmers were purposively selected to participate in the study. The study employed both experimental and descriptive survey designs to compare the effectiveness of video mediated learning and farm field demonstrations in the uptake of improved sorghum technologies. The technologies included seeds selection, land preparation, planting and weed control.

Training on video mediated learning. To implement video mediated learning sessions, electricity was installed a spacious hall and a small standby generator put in place. Laptop, network cables, screen, duplicated video discs accessed from www.accessagriculture.org website and sound enhancing systems were assembled in the identified hall. Sorghum farmers were assembled in the hall with assistance of local leaders. The facilitators explained vividly to farmers the importance of video mediated extension approach as a new paradigm shift in extension. Farmers were also informed that clips were available in 3GP format and could be shared with farmers who wished to have them on their phones on various agricultural technologies such as improved sorghum seeds selection, land preparation methods, planting methods, crop spacing, gapping and weed control technologies.

The implementation exercise was supervised by resource person from Ministry of Agriculture with key emphasis on four technologies including seeds selection, land preparation, planting and weed control sessions. Besides, during implementing of the technologies, farmers were allowed to review video clips which were anchored on the agent's laptop. The 3GP format of the videos were also available and could be shared with farmers who wished to have them on their phones.

Training on demonstrations. The author and resource persons identified a one acre farm which had been tilled up to secondary tillage level. Besides, the facilitators prepared the training and learning

material sourced from a manual on improved sorghum technologies. The mobilized farmers were then assembled on the farm with assistance of their local village leader. The farm demonstrations training were divided into two sessions whereby, farmers were subjected to learning and implementing specific improved sorghum variety technologies. They were engaged in learning improved sorghum technologies on seeds selection, land preparation methods, planting methods, crop spacing, gaping and weed control methods. On Saturdays, the group would implement what was learnt in the one acre piece of land.

Control group. The control group farmers were not subjected to either of the trainings. Farmers in this group were asked to plant on one acre farm relying on their prior knowledge on improved sorghum technologies through conventional methods of extension such as training and visit, radio programmes and agricultural shows.

Results and discussion

Farmers' socio-demographic characteristics: The results indicated that across the groups, 83% of the participants were female. Further, 62% of the respondents were aged between 20 to 59 years and 59% had acquired secondary school education (Table 1). The overall farmers' characteristics indicated that majority of the farmers trained across the three groups were literate and they were in their productive age, eager to try improved technologies.

Table 1. Farmers' socio-demographic characteristics in Embu County, Kenya

Variable	Characteristics	Overall n=66	VML n=22	Demo n=22	Control n=22
Gender	Male	17	6	5	06
	Female	83	43	31	06
Age	20-39yrs	26	11	7	08
	40-59yrs	36	20	10	06
	60yrs and above	27	11	8	08
Occupation	Farming	67	34	17	16
	Business	25	11	10	04
	Employed	08	04	02	02
Education	Primary	26	05	07	16
	Secondary	59	31	16	12
	Tertiary	06	04	02	-
HH, Leadership	Male	79	45	17	16
	Female	13	7	4	02
	Child	07	02	04	01
Years in school	Less than 8yrs	04	01	02	01
	Less than 16 years	83	43	31	06
	More than 17 years	12	05	02	05

Legend: VML=video mediated learning, Demo=Demonstrations, HH= Household

Source: Survey, 2017

Farmer implementation of improved sorghum technologies. Video mediated learned technologies: Overall, results revealed that 52% farmers successfully implemented the following technologies: weeds control (90%), planting methods (50%), land preparation (33%) and seeds selection (43%) (Table 2). The varying percentage of implementation across various technologies under study could be attributed to the fact that video were repetitively shown to farmers to reinforce specific details of technologies on farm. However, because of one day lapse between view day and implementation time coupled with fading of memory among farmers, there was varied uptake of technologies varied across the implementation cycle (Table 2).

Farm demonstration learned technologies. Using demonstrations, farmers implemented the following technologies successfully: weeds control (40%), land preparation (37%), planting methods (59%) and seeds selection (26%). The results indicated varying implementation percentage across technologies under study. The current results imply that farm demonstration influenced farmers into uptake and implementing satisfactorily weed control and planting methods technologies. Generally, farm demonstrations tend to elucidate less excitement on learning new techniques by farmers because of it's hands on nature.

Results revealed a positive correlation ($r=0.02$) between the age of the farmers and the uptake of land preparation technologies with old members of the family contributing to the uptake of improved sorghum technologies. Further, there was a positive relationship ($r=0.04$) between farmers' occupation and uptake planting methods technologies with both formally employed and practising farmers rapidly influencing adoption improved sorghum technologies. In addition, the results revealed a positive ($r=0.05$) correlation between education level of the farmers and uptake and implementation of weeds control technologies with education level of the farmers influencing the choice of weeds control methods

The farmers under control group were not exposed to any form of training, however, after evaluating the implemented technologies, the group achieved overall (29%) uptake and implementation of technologies such as seeds selection skills based on size of seeds (small, medium, large), seed colour, land preparation, planting methods, spacing and gapping and weeds control (Table 2).

Comparison of Video mediated learning, farm demonstration and control in the implementation of improved sorghum production technologies. The study revealed that video mediated learning approach was effective and superior to farm demonstrations in enhancing farmers' training and uptake of techniques such as seeds selection (43%), planting methods (50%) and weed control (90%). However, farm demonstrations was superior approach in enhancing farmers' uptake and implementation of land preparation techniques (59%), manure and fertilizer application (22%) (Table 2). Overall 52% of the techniques on video mediated learning approach were fully implemented on the farmers' one acre farm while 41% farm demonstrations approach and 29% control group implemented respectively. The results indicated varying trends of learning, uptake and implementation of technologies learned through video mediated and demonstrations approaches. The varying percentage of implementation across various technologies under study could be attributed to the fact that farmers retained information in their minds at a vary level.

Table 2. The evaluation matrix on implementation of improved sorghum technologies

Technologies	Techniques	Overall evaluation score	VML group	Farm Demo group	Control group
Seeds selection	White colour	5	5	4	1
	Brown colour	4	0	1	3
	Large size	5	5	0	0
	Medium size	4	0	0	0
	Small size	3	0	0	0
	Mixture	2	0	1	3
Sub total		23	10 (43%)	6 (26%)	7 (30%)
Land preparation methods	Tractor and ox ploughing	5	0	5	0
	Ox-Ploughing	4	0	0	3
	Tractor ploughing	3	3	0	0
	Hand digging	3	3	3	3
Fertilizer use	Fertilizer/Manure use	3	0	3	0
	Fertilizer use	4	3	0	0
	Manure/fertilizer use	5	0	5	0
Sub total		27	9 (33%)	16 (59%)	6 (22%)
Planting methods	Row by row	5	5	4	3
	Broadcasting	3	0	0	0
Spacing distance	30cm by 75cm	5	5	4	0
	40cm by 75cm	4	0	0	3
	50cm by 75 cm	4	0	0	0
Gapping	After 3 weeks of germination	5	5	3	0
	After 2 weeks	4	0	0	0
Sub total		30	15 (50%)	11 (37%)	6 (20%)
Weeds control	Hoe and hand weeding	5	4	4	5
	Hoe weeding	5	4	0	5
	Hoe and Hand uprooting	5	5	4	0
	Herbicide application	5	5	0	0
Sub total		20	18 (90%)	8 (40%)	10 (50%)
Overall score		100	52%	41%	29%

Key:

5. All of the technologies trained on were implemented
4. Only $\frac{3}{4}$ of the technologies trained on were implemented
3. Only $\frac{1}{2}$ of the technologies trained on were implemented
2. Only $\frac{1}{4}$ of the technologies trained on were implemented
1. Only $\frac{1}{8}$ of the technologies trained on were implemented
0. None of the technologies trained on was implemented

Note: Harvesting and Post-harvest techniques were not evaluated

Conclusion

It was concluded that farmers' age, gender, household leadership position and education levels greatly influenced uptake and implementation of improved sorghum technologies. Video mediated learning approach was rated as an effective and superior extension method for enhancing farmers' training and uptake of techniques in sorghum production. Demonstrations, because of associated practical aspects, enhanced farmers' uptake of land preparation technologies. We conclude that video mediated learning and demonstrations approaches have a potential of complementing each other as extension approaches and can increase efficiency in of learning and retention of technologies among farmers as well as widening coverage in a cost effective way. We therefore, recommend that where extension agents do not exist or do not have resources to carry out demonstrations, video mediated learning can be an alternative.

Acknowledgement

The research was funded by Video for Farmers' project implemented by Access Agriculture and funded by the Swiss Agency for Development and Cooperation [Project Number 7F-08378.01]. This paper is a contribution to the 2018 Sixth African Higher Education Week and RUFORUM Biennial Conference.

References

- Chiona, S. 2011. Technical and allocative efficiency of smallholder maize farmers in Zambia. Unpublished, MSc Thesis, University of Zambia, Lusaka, Zambia
- Dixon, J. 2010. Operationalising participatory research and farmer-to-farmer extension: The Kamayoqin Peru: Routledge Informa Ltd, Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK
- Erbaugh, J.M., Donnermeyer, J. and Kibwika, P. 2010. Evaluating farmers' knowledge and awareness of integrated pest management (IPM): Assessment of the IPM collaborative research support program in Uganda. *Journal of International Agricultural and Extension Education* 8 (1): 47-53.
- Gachimbi, L., Kamoni, P., Wanjogu, S.N., Macharia, P.N. and Gicheru, P. 2007. Land use practices in Mbeere District: Biophysical and socio economic challenges, coping strategies and opportunities: A Baseline Survey Report.
- Kamau, F. 2006. Challenges in provision of agricultural extension services in Kenya: An Evolution from public to public-private partnership. Paper presented during 10th Africa Forum, Windhoek, Namibia, 30th Oct – 3rd Nov. 2006
- Karubanga, G., Kibwika, P., Okry, F. and Sseguya, H. 2016. Empowering farmers to learn and innovate through integration of video-mediated and face-to-face extension approaches: The case of rice farmers in Uganda. *Cogent Food and Agriculture* 2: 1274944
- Munyua, H. and Stilwell, C. 2010. A mixed qualitative and quantitative participatory methodology. A study of the agricultural knowledge and information system (AKIS) of small-scale farmers in Kirinyaga district, Kenya. *Library Management* 31 (1/2): 5-18.
- Okumu, M. and Obora, M. 2013. Climate change and the Agricultural Sector report: Overview of National and Sectorial Initiatives and programmes. Ministry of Agriculture, Climate Change

Unit, Kenya.

Quizon, J., Feder, G. and Murgai, R. 2001. Fiscal sustainability of agricultural extension: Proceedings of the 3rd General Workshop of the Pan African Striga control Network, Harare, Zimbabwe.