



Factors Effecting Change in Rice Production Practices and Technologies among Smallholder Farmers in Kamwenge District, Uganda

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Abstract: This study unraveled the factors effecting change in rice production practices and technologies among smallholder farmers in Kamwenge district, Uganda. A longitudinal study involving six focus group discussions and 100 semi-structured interviews were conducted in August 2015 to February 2016, and later 21 key informant interviews in June 2018 to generate data from farmers and local extension staff. While thematic-content analysis was used for the qualitative data, SPSS v.18 was used for quantitative data analysis. Our findings indicate that changes in rice production practices and technologies were mainly influenced by a combination of factors including technological advancement, farmer ambitions, power dynamics, edaphic and climate variations, access to extension advisory services, use of Information and Communication Technologies (ICTs) such as video and information sharing among farmers. Informants approved the use of video as an important extension service delivery tool in equipping farmers with the necessary knowledge and skills that are key in influencing change in rice production practices and technologies. Video also triggers discussions among participants during and after the show through various knowledge sharing mechanisms with serious implications on change in production practices and technologies. As policy and decision makers attempt to reform extension delivery mechanisms, there is need to acknowledge that video alone cannot produce a desirable change in production practices and technologies among farmers but play a complementary role to other extension approaches in efforts to effectively disseminate relevant information.

Keywords: Learning, Production practices and technologies, Video participants, Videos, Uganda

Smallholder farmers in developing countries need appropriate technologies to enhance agricultural productivity (Bell 2015, Ssebagala et al 2017). Videos are recognized for promoting change in production and post-production practices where farmers get together to view and later put in practice what was observed (Bentley et al 2013, Cai and Abbott 2013). Van Mele (2006) pointed out that since 2002, Africa rice has produced farmer-friendly rice videos by interacting with farmers where they are able to share their experiences with fellow farmers in order to facilitate change in production practices and technologies (Bentley et al 2011). In Bangladesh, a concept of videos resulted in transfer of technology to farmers (Van Mele et al 2010, Karubanga et al 2017a, Gramzow et al 2018). However, the context in which farmers learn, produce and how they are organized and managed are presumed to affect the choice of the production practices and technologies. For example, prior knowledge about production practices and technologies, leadership, prevailing extension service delivery, farmer expectations, information sharing and use of audio-visual tools are likely to influence the choice of practices employed by the farmers (Bentley et al 2015).

In Uganda, since 2007, the Sasakawa Global 2000 (SG 2000), a non-government organization (NGO) piloted use of videos in 14 districts across the country in four regions, Western (Kamwenge and Ntungamo), Central (Mukono, Buikwe and Wakiso), Eastern (Jinja, Kamuli, Namutumba and Tororo) and Northern (Lira, Dokolo, Apac, Oyam and Gulu). In Kamwenge district the rice videos were shown from 2007 with the intention of promoting better rice production practices among smallholder farmers and later stalled in 2010. Even without external support from SG 2000, farmers produced rice based on the information got from the videos and continuously learn from each other through various knowledge sharing mechanisms. Karubanga et al (2016a, 2017a) basically focused on the farmer learning about rice production practices and technologies through video-mediated extension approach with limited focus on factors that trigger change in the rice production practices and technologies from the perspective of farmers. Thus, this paper focuses on unraveling the factors effecting changes in rice production practices and technologies from the perspective of video participants with particular focus on the potential of video in triggering these changes.

MATERIAL AND METHODS

Study area and design: A longitudinal study was conducted in Mahyoro sub-county in Kamwenge district, Uganda. The district was selected for this study because SG 2000 showed videos there from 2007 to 2010 with the aim of enhancing change in rice production practices and technologies. The study was conducted in eight purposively selected villages within the same sub-county (Fig. 1). The villages were purposively selected because it is where the video participants that were recorded in the register came from. The villages were also selected by census, taking all those that were in the records of the association. The study employed a qualitative approach relying mainly on group interviews of the smallholder rice farmers who were targeted by SG 2000 in the sub-county. To gain more quick understanding of the factors fostering change in rice production practices, a longitudinal study was conducted by following up and interviewing the respondents.

Sample selection: About 100 video participants were selected by taking all those whose names appeared in the records of Mahyoro Rice Farmers Association (MARFA). Out of these 100 video participants, a total of 71 men and 29 women (Table 1) respectively were contacted to gain their insights about the factors that influence change in the rice production practices and technologies. A total of 48 Focus Group Discussion (FGD) participants were purposively selected from a list containing 100 video participants following the farmers' experience in rice production as guided by local extension staff. The selection of FGD participants was based on gender and the villages where participants came from. Out of 48 FGD participants, 19 were men and 29 were women (Table 1). More women were selected for FGDs because of their involvement in rice production. Together with the chairperson of MARFA, the video participants were sorted in alphabetical order of the names using the attendance lists to avoid double selection in case they registered twice. Following the registers of the association, FGD participants were selected per village as indicated in Table 1. Notably, in five villages characterized as being distant from the association such as Rwentuma, Buhindagi, Kitonzi, Katanga and Burembo registered low attendance of 1-2 video participants (Table 1). All the participants from these villages with low attendance were purposively selected for FGDs. In June 2018, a follow up study was conducted whereby 21 key informant interviews were held with purposively selected participants including 16 rice farmers and five local extension staff (those who organized and managed video shows). These interviews were conducted to clarify some of the key issues that emerged in the focus group discussions regarding the factors that influence change in the

Table 1. Number of FGD video participants per village (n=48); Individual interviews (n=100)

| Village | Number of men | Number of women |
|-------------------------------|---------------|-----------------|
| FGD participants | | |
| Rwetuma* | 1 | 1 |
| Buhindagi* | 1 | 1 |
| Kitonzi* | 0 | 1 |
| Burembo* | 0 | 1 |
| Katanga* | 1 | 1 |
| Kitomi | 3 | 5 |
| Karere | 7 | 9 |
| Kyendangara | 6 | 10 |
| Sub-total | 19 | 29 |
| Individual and key informants | | |
| Individual interviews | 71 | 29 |
| Key informant interviews | 14 | 7 |
| Sub-total | 85 | 36 |
| Totals | 104 | 65 |

Source: MARFA registers, FGDs = Focus Group Discussions,*Villages with low attendance of video participants

rice production practices and technologies. The farmers were purposively selected because during the FGDs they exhibited vast knowledge and experience about the factors that enhanced change in rice production which required a follow up as well as observing the changes in the way they produced rice.

Data collection methods: Various methods were used to collect data from the informants including focus group, individual, and key informant interviews as well as field observations. For example, six FGDs were conducted in above stated eight purposefully selected villages. Some of the key issues that were discussed were mainly related to how the video enhanced learning about new rice production practices and technologies. In particular, the focus of the interviews was to understand how the various factors influenced change in the rice production practices and technologies. The factors assessed were related to farmers' knowledge about rice before viewing the video, farmers' ambitions, technological advancement, power dynamics, edaphic and climatic related factors, extension service delivery and the influence of information sharing. These factors were arrived at during the analysis stage of the data that were collected from the FGDs. Semi-structured individual interviews were also conducted to ascertain the proportions of changes in the key aspects of rice production practices and technologies. To complement the FGD and individual interview findings, 21 field observations were made to ascertain the extent to which video participants during key informant interviews implemented rice production practices and technologies.

Data analysis: The qualitative data generated through FGDs, field observation and key informant interviews were analyzed by applying content analysis and coding through extracting and relating information on the factors that influence change in rice production practices and technologies. The qualitative contextual data analysis was done in the field during and after data collection process. This minimized the loss of meaning of video participants' explanations. It also involved writing, re-writing, re-visiting the data and verifying the findings with the respondents before making conclusions. Quotes were used to support the narrative description and explanation of the study variables. Quantitative semi-structured individual interview data were entered in the SPSS 18.0 version to generate percentages on the key aspects of rice production practices and technologies.

RESULTS AND DISCUSSION

Farmers' knowledge about rice: Farmers' knowledge and awareness about rice and the associated practices is one of the key triggers that fostered changes in the rice production practices and technologies. Our findings indicate that, before 1998, most farmers did not know about rice and the associated production practices and technologies. Prior to the introduction of videos by MARFA, rice was first heard

being grown in the neighboring districts of Kasese and Bushenyi. During the FGDs, participants revealed that rice production in Mahyoro sub-county of Kamwenge district started in 1998 and farmers were using primitive methods to produce rice (Karubanga et al 2017b). Initially, farmers in their respective villages were involved in growing maize, millet, beans, soya beans, cassava and groundnuts for both income and food (Karubanga et al 2017a). Cotton was also grown mainly by men as a source of income while millet and ground nuts were largely grown by women for the same reason. Rice was only seen being served at various social functions. Kyendangara and Karere FG participants pointed out that, in late 1990s rice was mainly seen in images of published papers and books with limited knowledge about how it could be grown. Rice was believed to be the food for the whites or Indians as well as for the rich people. Because of this perception, adoption of rice production and associated practices occurred gradually in the respective villages as farmers took time to experiment rice production and assessing its profitability (Bentley et al 2015, Karubanga et al 2017b). Principally, farmers learnt about rice production from their fellow farmers because they lacked support from extension agents and farmer organizations to foster learning about new rice production practices. This lack of external support made farmers to depend on the experiences of their

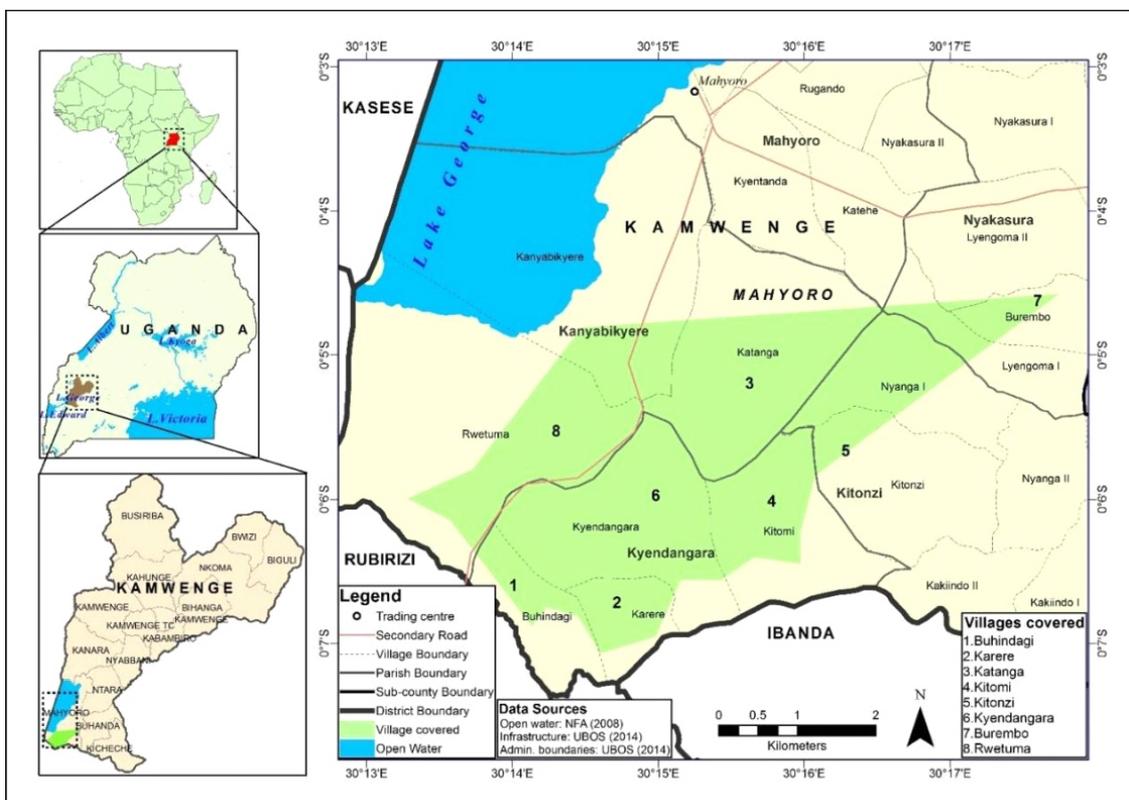


Fig. 1. Villages selected for the study in Mahyoro sub-county, Kamwenge district

fellow farmers. FG participants noted lack of prior knowledge about rice production and post-production practices and technologies as a key contributor to poor quality and quantity of rice. For example, one of the male FGDs in Karere village revealed that in 2001 farmers in the area knew little about rice and its associated production and post-production practices, thus leading to low rice productivity.

Farmers' expectations about rice: Farmers' ambitions about rice as a major source of income and food security was cited during the FGDs and individual interviews as a major motivational factor that led to diverse changes in rice production and post-production practices. Majority of the respondents (41%) grew rice as a primary source of income while 36% grew rice for food and 23% for seed. In order to enhance rice production, farmers had diverse expectations that would boost rice production from SG 2000 through MARFA regarding access to free or subsidized production inputs and information in order to influence change in rice production practices and technologies. The 20 per cent of farmers expected the availability of free or subsidized inputs and equipment for rice production while 31 per cent expected more information about agricultural markets from SG 2000. Others expected information from SG 2000 staff on quality of rice and information about crop problems that are likely to affect rice productivity. Because of their higher ambitions, the farmers forged mechanisms geared towards improving rice production (Danielsen et al 2015). Farmers were able to form groups in order to access advisory services and support from the association such as access to clean rice seed. The emergence of farmer groups also led to timely performance of rice production activities such as planting, weeding and harvesting.

During FGDs, farmers described rice as the most profitable crop. Because of this belief, farmers sought for support from the association to provide them with free production inputs such as seed, equipment and fertilizer to enhance rice productivity. The association initially provided these inputs freely to farmers that belonged to the association and later ceased because the numbers were growing bigger and could not sustain the demand. Conversely, to ascertain the profitability of rice, farmers compared costs involved in rice production with that of maize and cotton. The farmers considered the costs of rice production in terms of expenses in land preparation, securing the seed, and labor requirements alongside the existing market prices (Ssebagala et al 2017). The farmers who managed to meet the production costs especially those attached to the association reportedly exhibited better production practices and technologies as they were exposed to advisory services from SG 2000 staff. Besides, the relative

costs involved in producing rice, FG participants concluded that rice had more economic returns than maize and cotton. Because farmers had developed higher expectations from growing rice, they changed their cropping systems by abandoning some traditional crops characterized as being low in terms of profitability such as cotton and millet resorting to rice production.

Power dynamics: Discussions with the focus group participants revealed that before the formation of MARFA, farmers in Mahyoro sub-county struggled to access some of the social services such as trainings and production inputs. Farmers mainly depended on the experiences of their fellow farmers in order to change the production practices and technologies (Bentley et al 2014, Karubanga et al 2017a). In late 1990s there was no champion to help farmers to have access to the social services meant to enhance the way farmers produce. The use of traditional technologies was partially attributed to lack of a focal person to link farmers to services providers. It was thus problematic for farmers to take up new practices and technologies without technical support. To avert the situation, in 2001 MARFA was formed to help farmers access some of the social services. The leadership of the association was composed of nine committee members who collectively worked with the farmers to enhance rice production in the area. FG discussions and key informant interviews revealed that good leadership from the chairperson relatively influenced farmers' access to social services. For example, FG participants pointed out that the trainings which farmers received from the association was attributed to the efforts and commitment of the chairperson. Farmers described the chairperson as a trusted and committed person with high reputation that made the association grow. Farmers were able to access new technologies that influenced the way they produced rice (Nijbroek and Andelman 2016). For instance, they had access to rakes, threshers, milling machines, herbicides, pesticides and fertilizers. In their opinion, farmers commented that the use of these technologies helped them to enhance the quality and quantity of rice. On the contrary, in 2010, conflicts among the committee members over leadership positions emerged. FG participants commented with concern that the emergence of conflicts partly contributed to the standstill of key organizational activities such as trainings through demonstrations, video shows, exchange visits and field days which were key in enhancing knowledge about rice production practices and technologies. In addition, bulking and collective marketing of rice by the farmers stalled. In the same year, a three-year SG 2000 project that supported farmers with training through video shows also ended with serious implications on farmers'

ability to access information on improved rice production (Karubanga et al 2016a). Following the decline of the association, farmers resorted to old ways of rice production such as using home-saved seed and planting rice by broadcasting. There was no more application of chemicals by farmers because they were expensive to buy (Karubanga et al 2017a, Ssebaggala et al 2017). In their opinion, resorting to old ways somehow affected the quality and quantity of rice. As a result, this forced farmers to change their cropping systems. Female farmers, in particular, opted for their traditional crops such as millet, ground nuts and sweet potatoes which they grew for both cash and source of food while some men resorted to producing maize purposely for income generation. In their opinion, Kitomi and Rwentuma FG participants pointed out that traditional crops do not require use of expensive chemicals and are not much susceptible to changes in climate.

Edaphic and climate related factors: The general environment within which farmers produce rice is an important factor that influence change in rice production practices and technologies (Martins et al 2014, Ssebaggala et al 2017). Holding discussions with video participants in their respective villages revealed that changes in rice production and post-production practices were due to environmental and climate related factors. For example, one of the FG participants from Buhindagi village mentioned that in 1990's the soils were still fertile and farmers never applied fertilizers and other related chemicals like herbicides and pesticides because the weeds, pest and disease related problems were not prevalent. However, since 2001 the soils became exhausted with high invasion of resistant weeds like couch grass, nut grass and star grass. Pests and diseases such as rice stalk borers and root rot respectively became prevalent; affecting the yield and quality of rice. In 2004, farmers started using fertilizers, herbicides and pesticides to regain soil fertility, control weeds and pests and disease respectively. Other farmers practiced crop rotation because they lacked finances to buy expensive chemicals (Karubanga et al 2017a). In their opinion, FGD participants believed that crop rotation enables soil fertility regeneration. However, this only applies to farmers with three or more acres of land (also see Karubanga et al 2017b). For example, discussions with FG interviewees from Buhindagi, Burembo, Katanga, Kitonzi and Rwentuma villages revealed that farmers rotate rice with beans and ground nuts to generate soil fertility and break the pest and disease life cycle. Individual interviews showed that about 46% of farmers with small pieces of land (about one or half an acre) hire fertile land to enable them produce higher yields of quality rice.

In particular, climate changes characterized by drought

threatens rice production among farmers (Mabe et al 2014, Ssebaggala et al 2017). Majority of the rice farmers (95%) described the effects of drought as being disastrous to rice production. For instance, drought causes stunted growth, drying and total failure of rice leading to low and poor quality of rice (Ssebaggala et al 2017). In response, farmers started growing alternative crops which they believed to be fast growing and tolerant to drought such as beans and maize. These were mainly grown in the first season associated with the longer dry spells (December-March). Rice is grown in the second season (July-early December) because during this time farmers experience high rainfall intensity. This helps farmers to counteract the effects of drought. Generally, changes in rice production practices have been attributed to variations in soil and climatic conditions. FG participants recommended that provision of free or subsidized inputs by local agencies and government would help farmers to combat the soil and climate related challenges, thus enhancing both the quantity and quality of rice produced.

Extension services delivery: Conversations with FGD participants revealed that between 1990's and late 2004, farmers in Mahyoro sub-county had not yet exhibited proper rice production practices and technologies because they were not yet fully exposed to extension services. This was attributed to the way extension services under recent National Agricultural Advisory Services (NAADS) were organized and operationalized (MAAIF 2016, Danielsen et al 2015). Rwentuma and Buhindagi FGD participants pointed out that at that time NAADS services were irregular and unreliable. For example, individual interviews indicated that NAADS through its extension staff reached a small proportion of rice farmers (6%). As earlier stated, because of lack of adequate extension service provision from NAADS the survey findings showed that farmers mainly relied on their fellow farmers (21%) for information in order to learn about new practices and technologies in rice production (also see Karubanga et al 2017a). Farmers mainly acquired trainings in beans and maize production, the major enterprises that were selected by farmers under NAADS program. Besides being the most profitable enterprise, farmers never selected rice under the recent NAADS program because it was a new crop in the area and easily affected by drought.

Despite the existence of NAADS since 2001, farmers in Mahyoro sub-county still lacked the necessary knowledge and skills in rice production and post-production practices and technologies. This partly was attributed to inadequate human resource capacity coupled with inadequate transport facilitation thus limiting wider geographical coverage. There were no motorcycles provided to NAADS staff to reach all the farmers in the sub-county. Only easy to reach farmers were

covered. The chairperson of MARFA further commented with concern that some farmers traveled to the sub-county headquarters located far away to consult the extension worker. In his opinion, the chairperson recommended that there was need for approaches that can bring farmers together for collective on-the-spot information access such as through the video. The video was described as a cheap, reliable tool providing on-the-spot information to many farmers at one point in time (Okry et al 2014, Karubanga et al 2016b). In 2007, SG 2000 introduced the use of video developed in Benin to train and capacitate farmers in proper rice production and post-production practices. Working in liaison with MARFA leadership, SG 2000 staff showed the English version videos to farmers on predetermined Fridays, starting at 7:00 pm to 10:30 pm at MARFA offices to promote better rice production practices and technologies among farmers over a period of three years (Karubanga et al 2016b). The video covered all the eleven steps necessary in rice pre-production and post-production practices and technologies. In their opinion, FG participants approved the video as an important tool in fostering learning about new technologies and change in practices among rice farmers (Van Mele et al 2016, Karubanga et al 2017a). Some of the new practices which the FG participants pointed out as key lessons learnt included: timely land preparation, timely planting of clean seed, timely weed control, drying rice on tarpaulins, timely fertilizer application and finally timely harvesting of rice to avoid pre and post-harvest losses. Individual conversations with video participants revealed that video is an important tool in triggering change in rice production practices and technologies because it is able to demonstrate to the viewers the necessary steps chronologically (Bandura 1997, MacGregor 2007, Bede 2016). Key informants and FG participants appreciated the role played by SG 2000 in showing the videos that provided them with necessary knowledge and skills that enhanced learning about proper rice production practices and technologies. However, they recommended that for more effective service delivery and change in rice production practices and technologies, the use of video needs to play a complementary role to the conventional extension. This is because more technical support is needed by farmers from extension staff besides viewing the video as affirmed by Karubanga et al (2016a).

Technological advancement: Focus group discussions revealed that initially, rice farmers employed traditional technologies to grow rice. Planted Superica variety which was procured from their fellow farmers. This variety was characterized as having low weight, susceptible to birds and took about six months to mature. Farmers were also not using fertilizers, pesticides and herbicides. Planting was

mainly done by broadcasting rice and the knife was used during harvesting to cut only mature tussles. Rice was threshed by beating using sticks and the mortar and pestle were used to mill rice. In addition, individual interviews revealed that 92% of the farmers initially dried rice on bare ground. In 2007-2010, through the efforts of the association, the emergence of new technologies in rice production occurred. These new practices and technologies triggered changes in the way farmers produced rice. There was an introduction of new rice varieties such as NERICA 4 and 10 that were high yielding, resistant to diseases and took about 3-4 months to maturity. Planting of rice was done using forked rakes, farmers started using chemicals such as fertilizers, herbicides and pesticides. The sickles were used to harvest rice, milling of rice was done by modernized millers located at the association. Farmers used one thresher provided by the association to thresh their rice which was later dried on tarpaulins. Holding discussions with MARFA chairperson revealed that the use of these new technologies by farmers led to enhanced quality and quantity of rice. The planting of new varieties in lines using the forked rake coupled with the use of chemicals enhanced crop yields. In addition, use of milling machines, sickles and threshers quickened the accomplishment of rice production processes and activities. The sickles and threshers respectively quickened the harvesting and threshing activities. Furthermore, the use of tarpaulins by farmers ensured the production of quality rice without stones and sand. Overall, such technological advancements partly explain the kind of changes in the rice production practices and technologies among rice farmers.

Influence of video on rice production practices and technologies: Individual interviews with video participants revealed that majority of the rice farmers (94%) regarded the information got from the video as being useful in fostering change in rice production practices and technologies. About 73% of video participants implemented the practices and technologies viewed in the video and approved the information they got as helping in fostering change in rice production practices and technologies. FG participants stipulated that the video clearly showed the eleven activities involved in rice production. Field observations revealed that, farmers were able to select seed for planting. Seed selection was done during harvesting where only clean and uniform varieties were picked to prevent the mixing of varieties. This practice also allowed for more viable and clean seed to be selected for the subsequent seasons. Analysis of multiple responses revealed that about 40% of the farmers were able to timely manage the weeds. Some farmers exhibited capacity to plant rice in lines (17%). Other changes were observed among the farmers trying to use Butanyl 70 to

control weeds (16%), 10% tried to plant different rice varieties such as NERICA. About 8% of the farmers were drying rice on tarpaulins and 6% applied artificial fertilizers to improve on soil fertility. Only three farmers in Rwentuma village were able to irrigate their rice fields because they had access to water. While FG participants attributed the changes to efforts of SG 2000 in showing rice videos to farmers, the chairperson of the association pointed out that the changes were to some extent due to farmers gaining information from other sources such as fellow farmers, leaders and extension agents. Overall, SG 2000 rice videos coupled with demonstrations allowed farmers easy acquisition and understanding about the new knowledge and skills that enabled farmers change in the way they produced rice.

Conversely, in an attempt to implement the practices promoted via videos and other sources of information, farmers were faced with vast challenges. Particular challenges associated with the video was the use of more technical language “English” to document the farmers during filming process. FG participants pointed out that the use of technical language limited their understanding of the promoted practices and technologies. This partly explains why particular farmers especially the less educated did not apply the recommended practices and technologies and resorted to the old ways of producing rice. Key informants recommended documenting local farmers for easy understanding of the information, identification and adaptation of the acquired practices and technologies. The process of acquiring information about the use of agricultural inputs and ability to acquire them is a major concern among farming communities (Danielsen et al 2015). Focus group discussions identified other challenges which farmers faced in implementing what they saw in the video. The identified challenges included: lack of access to clean seed for planting, lack of equipment (sickles, threshers, milling machines and tarpaulins), and chemicals (pesticides, herbicides and fertilizers), and inadequate technical knowledge and skill in chemical mixing and use of a thresher. The lack of these production inputs had a direct and/or indirect influence on adoption of technology. In other words, the seed sold in the local agro-shops was mixed and did not meet the market demands such as uniform grains. Field observations revealed that some farmers were harvesting rice using knives, threshing using sticks and drying rice on bare ground. Some farmers resorted to planting home-saved seed while others secured loaned seed from their fellow farmers. Thus, video participants recommended the government through local agencies to provide free or subsidized production inputs to ensure effective change through implementation of the recommended practices/ technologies.

Table 2. Influence of video use on change in rice production practices and technologies

| Practice and technology | Percentage |
|---------------------------------|------------|
| Timely planting | 40 |
| Line planting | 17 |
| Timely weed control | 16 |
| Planting diverse rice varieties | 10 |
| Fertilizer application | 6 |
| Drying rice on tarpaulins | 8 |
| Irrigating rice fields | 3 |
| Total | 100 |

Source: Survey data, 2016

Information sharing: Change in rice production practices and technologies are also influenced by sharing of information among farmers. Focus group participants pointed out that information sharing is one of the key triggers fostering change in rice production practices among rice farmers. Farmers had diverse mechanisms through which they shared information among themselves and the extension staff. Individual interviews revealed that farmers sought information from various sources in order to change. Some of the mechanisms which farmers used to share information about rice, and its related practices and technologies included: i) consulting fellow farmers; ii) consulting group leaders; iii) consulting local extension workers; iv) holding discussions at the demonstration sites; v) through group and community meetings; vi) attending field days; viii) viewing video and ix) through songs and drama. The farmers shared information with fellow farmers when they visited each other at their respective homes and/or fields for purposes of adapting the acquired knowledge and experiences regarding rice production practices and technologies. Others shared information while performing home-based or group-based garden activities like planting, weeding and harvesting rice. In their discussion farmers focused on how well and when the practices are being implemented.

Regarding the effectiveness of the video to influence change in rice production practices and technologies, farmers preferred video shows because they were able to see and hear what was being demonstrated. The only challenge was that the people talking in the video were foreign (from Benin) to the viewers. They also suggest that use of video to influence change in the way rice is produced should be coupled with demonstration sites, field days and exchange visits to allow video participants an opportunity to practice and observe the technologies viewed in the video. In particular, FG participants deemed the video as important tool in triggering discussions among the participants during

and after the show. It is a tool that convinces and motivates viewers to try out the best practices and technologies being demonstrated (MacGregor 2007, Bentley et al 2015). FGD and individual interviews with video participants described video as effective because of its positive attributes that enhance farmer learning and change such as clarity of images, ability for farmers to use visual and audio senses, attractiveness of images as well as ability to enhance memory of farmers. In their opinion, informants believe that these attributes could have contributed to the changes in rice production practices. In addition, informants said that holding guided discussions with fellow farmers after the video show allows for comprehension of the messages communicated in the video. FGDs revealed that interactive learning never occurred in a video hall as farmers were busy viewing the video. They believed that learning mainly occurred outside the video hall as they discussed and implemented what was shown in the video. They commented that changes in rice production practices cannot be reflected while viewing the video but can be exhibited when the farmers try to implement what they have seen (Danielsen et al 2015). Thus, the video mainly triggers discussions among the video participants during the viewing and interactive learning occurs after when they discuss and share their experiences. For example, FGD participants added that learning took place later after the video show when farmers started working together and sharing experiences among themselves on how to implement what they had acquired.

CONCLUSION

This study unraveled the factors effecting change in rice production practices and technologies among smallholder farmers in Kamwenge district, Uganda. Our findings indicated that change in rice production practices and technologies was mainly influenced by a combination of factors including technological advancement, farmer ambitions, power dynamics, edaphic and climate variations, access to extension advisory services, use of Information and Communication Technologies (ICTs) such as video and information sharing among farmers. Among various contributing factors, the use of video proved to be key in triggering change in rice production practices and technologies through fostering learning as it elicits discussions that lead to critical reflection and sharing of experiences among participants. The videos enhance uptake of new practices and technologies leading to high rice yields. As policy and decision making body attempts to reformulate the extension delivery, efforts have to be made to integrate videos into the existing mode of extension delivery in order to produce desirable and adaptive changes. Thus, in

the current drive towards reforming extension services in Uganda, video is a promising option that triggers change in practices and technologies among rice farmers and those involved in other agricultural related enterprises. It is also known for providing the large audiences with better knowledge about production practices, especially if they are taken close to the farming communities. Video as a medium is suited for the transmission of information, knowledge and skills meant to change the way farmers produce, particularly those with low literacy levels. However, this requires a more holistic extension approach that supports effective use of video to equip farmers with new knowledge and skills geared towards ensuring more contextualized change in production practices and technologies.

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