International Journal of
Recent Innovations in Academic Research
Open Access, Peer Reviewed, Abstracted and Indexed Journal

E-ISSN: 2635-3040; P-ISSN: 2659-1561
Homepage: https://www.ijriar.com/
Volume-5, Issue-5, May-2021: 8-18

Research Article

Adoption and Impact of Agricultural Extension Technologies in the Jong Chiefdom, Bonthe District, Southern Sierra Leone

[1]David A. Mansaray, [2]Saffa Barbee Massaquoi and [3]Susan Sia Quee

[1,2,3]Department of Agricultural and Home Economics Education, School of Education, Njala University.
Email: [1]david.allieu.mansaray@njala.edu.sl; [2]saffabarbeemassaquoi@yahoo.com; [3]susanquee@gmail.com

Received: April 29, 2021 **Accepted:** May 11, 2021 **Published:** May 22, 2021

Abstract: Agricultural extension technologies (AETs) have enabled small-scale farmers in developing countries to increase production with minimal capital investment. AET bridges the gap between traditional subsistence and modern mechanized agriculture. Farmers adopting AETs have been making remarkable progress in their farming practices resulting in increased crop and livestock production. The study investigated the adoption and impact of AETs on farmers and their communities. The target population comprised farmers in the Jong Chiefdom in the Bonthe District in southern Sierra Leone who have participated in extension workshops/seminars. A sample of 46 farmers selected randomly participated in the study. Structured questionnaires were used to gather information on the adoption and impact of AETs. AETs adopted by farmers were ox-plough, winnowers, peelers, graters, shellers, hullers, fryers, crackers, foo foo dwellers, pressers, improved animal breeds, veterinary services and fish pond construction. It is concluded that farmers in the Jong Chiefdom were primarily low level adopters of AETs. Nonetheless, farming operations improved in the chiefdom owing to the adoption of AETs. Even though farmers appreciated the role of AETs, many could not afford or purchase the technologies. It is recommended that providing credit facilities would enable farmers to purchase AETs. Re-introducing AETs with low-level adoption would also increase farmers' access to the innovations.
Keywords: Adoption, agricultural extension technologies, food production, impact, Jong chiefdom.

Introduction

Farmers with limited resources provide the bulk of the food on which billions of people depend for the reason that much of the world's intensive food production is on small land holdings (Jayne, Yamano, Weber, Tschirley, Benfica, Chapoto, & Zulu, 2003). By every indication, their predominant role in food production persists. Therefore, the potential for improved food production would be notable if yields were increased on each hectare. Improving the technological capability of smallholder farmers in developing countries stands to increase significantly their productivity and production levels. Apparently, increasing domestic food production would improve available supplies for domestic consumption, control food prices and facilitate the balance of overseas' payments.

Before the brutal Civil War, the largest sector of the economy of Sierra Leone was Agriculture which contributed 80% and 30% to her Gross Domestic Product (GDP) and export earnings, respectively (Food and Agriculture Organization [FAO], 2010). Today, agriculture in the country is underdeveloped and supported primarily by small-scale farmers. The government has been responding to the problem by increasing public investment in the agricultural sector. The main thrust

of this increased commitment was the introduction and support of Integrated Agricultural Development Projects (IADPs) (World Bank, 2014). The projects used AETs to help farmers increase productivity, which apparently brought about improvement in the living standards of the people. The technologies and innovations included high yielding crop varieties, improved agricultural practices and labor-saving devices (World Bank, 2014).

The primary farming practice in sub-Saharan Africa has been "slash and burn" for arable food crop production with the use of rudimentary tools that are characterized by drudgery. This method is primitive and can no longer cope with the consumption needs of the exploding population. As a result, the agricultural sector has been grossly underdeveloped and dominated largely by peasant peripheral farmers. This reality has given rise to the development and introduction of AETs that presumably fit the economic, social and financial capabilities of the small-scale farmers. Considering the successions of AETs various agencies have introduced to upgrade farming practices and production levels, it is informative to examine the level of adoption and impact of AETs on food production and processing in the farming communities of Sierra Leone.

A technology could be specialized knowledge, skills, methods, techniques or hardware required for the production and distribution of goods and services. Agricultural technology can be embodied in people, tools, crop varieties, agricultural practices, and processing equipment. Introducing new technologies that farmers adopted is supported by diffusion of innovations theory (Rogers, 2003). The theory takes into consideration perceptions of would-be adopters regarding relative advantage over the existing activities as well as compatibility with the needs, values, and norms of potential adopters (Rogers, 2003). According to Rogers (2003), "relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes" (p. 15) and "the compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p. 249). In this study farmers viewed the AETs to have relative advantage because traditional tools are characterized by drudgery and low production while imported technologies are more expensive. Generally, new technologies, such as the AETs adopted by farmers in the Jong Chiefdom, are not usually difficult to use, making them compatible with the past experiences of the adopters (Moriba, Kandeh, & Edwards, 2011).

By every indication, new technologies must be appropriate for the users and their communities. Some scholars refer to such innovations as *appropriate technology,* which "makes the most economical use of a country's natural resources and its relative proportions of capital, labor and skills; it fosters attainment of national and social goals" (Moriba, *et al.,* 2011). The United Nations Industrial Development Organization (UNIDO) (1979), described appropriate technology as the 'technology mix' that contributes economically, socially, and environmentally concomitant to available resource endowments and conditions in a country.

The AETs adopted by in farmers of the Jong Chiefdom was intended to improve their food production capacity. However, there is growing concern by the government, AETs providers and the farming community about the adoption and impacts of the new farming technologies. Therefore, the need existed for an investigation regarding the levels of adoption and impact of AETs on farmers and their communities.

Purpose and Objectives of the Study

The purpose of this study was to investigate the adoption level and impact of agricultural extension technologies on farmers and their communities in the Jong Chiefdom, Bonthe District, a Southern Sierra Leone.

The specific objectives of the study were to:

1. Identify the types of agricultural extension technologies introduced and adopted in the Jong chiefdom.

2. Identify the adoption level of agricultural extension technologies by farmers in the Jong Chiefdom.
3. Describe the impact agricultural extension technologies adopted by farmers in the Jong Chiefdom.

Methodology

The study was conducted in the Jong Chiefdom, Bonthe District in the Southern Province of Sierra Leone. The chiefdom is one of the most important and prosperous chiefdoms not only in the Bonthe District but also in the entire Southern Province. An estimated population of 320,000 people (Census Report 2015) mostly crop or fish farmers, inhabited the Jong Chiefdom, which is about 100 square miles in area. The study was descriptive which assessed the adoption and impact of AETs introduced to farmers in the chiefdom.

The study's target population included farmers (N = 52) in the Jong Chiefdom who had attended workshops and seminars that focused on AETs. A sample of 46 farmers selected randomly participated in the study. The researchers trained two volunteers who administered questionnaires and collected data in 8 sections of the chiefdom. The data collected were analyzed using the Scientific Programme for Social Sciences (SPSS) verse 15.

Findings and Discussion

Agricultural Extension Technologies Adopted

Land preparation: Figure 1 describes the land preparation technologies farmers adopted. A majority of the farmers adopted the power tiller (86.9%) and about one-third of them adopted the ox-plough (32%) (Figure 1).

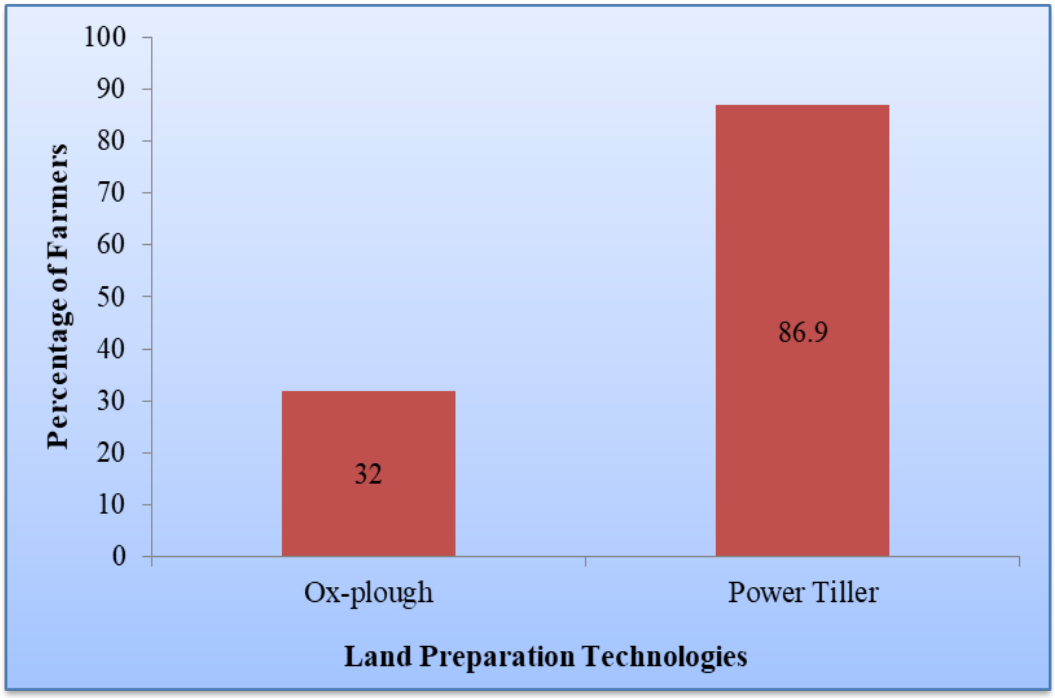

Figure 1. Land Preparation Technologies Adopted by Farmers

Crop Management: Figure 2 illustrates the crop management technologies farmers adopted. All of the farmers (100%) adopted the hunting technology. Further, most of the farmers adopted the following crop management technologies: high yielding crop varieties (97.8%), short duration crop varieties (91.3%) and the use of organic manure (88%). No farmer adopted the weedicides to manage their crops (Figure 2).

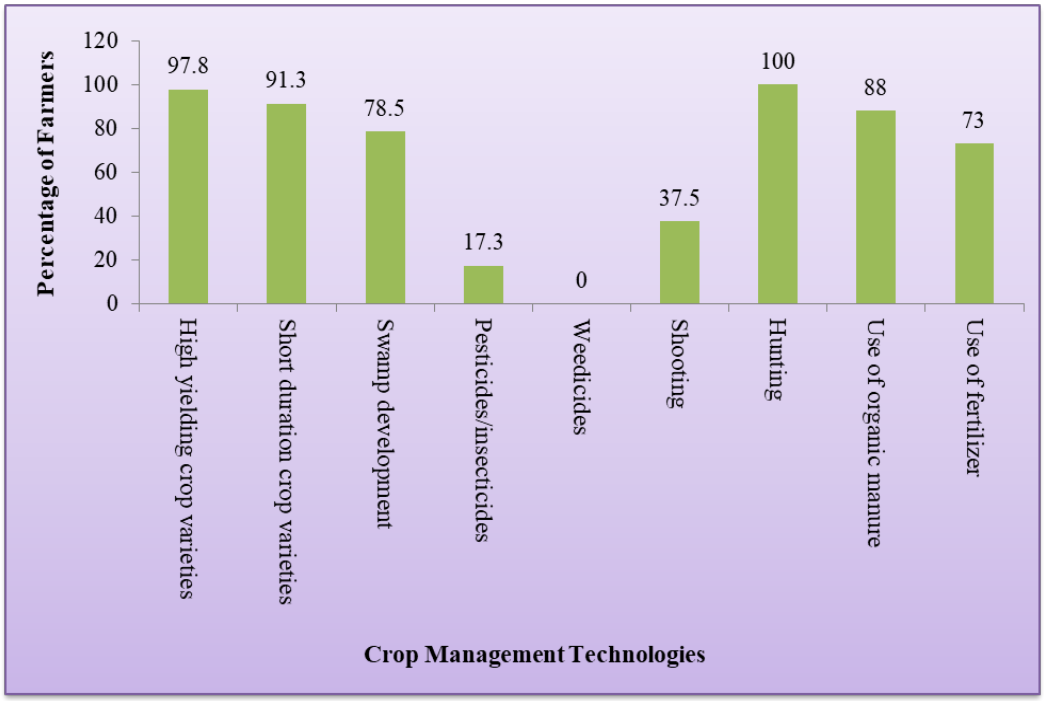

Figure 2. Crop Management Technologies Adopted by Farmers

Crop Processing: Figure 3 shows the crop processing technologies farmers adopted. All of the farmers (100%) adopted the cassava graters (see Figure 3). Most of the farmers adopted gari fryer (97.8%), hullers (82.6%) and palm kernel nut crackers (74%). None of the farmers adopted hand winnowers, cassava peelers and maize sellers (Figure 3).

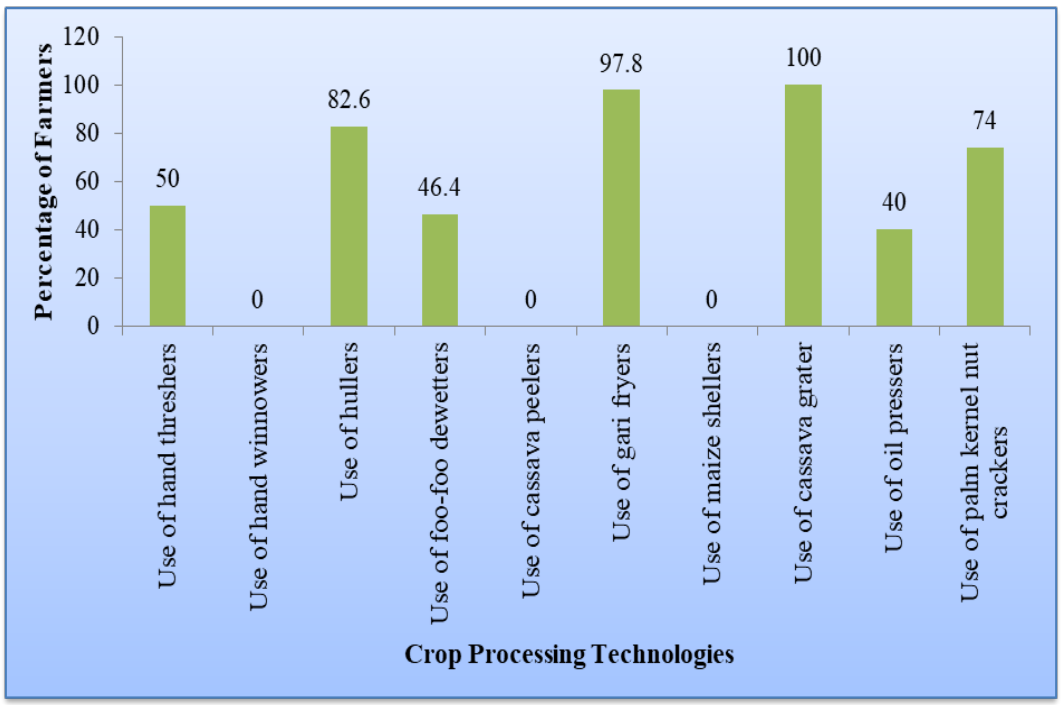

Figure 3. Crop Processing Technologies Adopted by Farmers

Animal Production: Figure 4 shows animal production technologies adopted by farmers. The figure indicates that 93.4% of the farmers reared small ruminants, 89% used improved animal breeds and 59.4% used veterinary services. Fewer farmers adopted castration (24%) and fish pond construction (7%) (Figure 4).

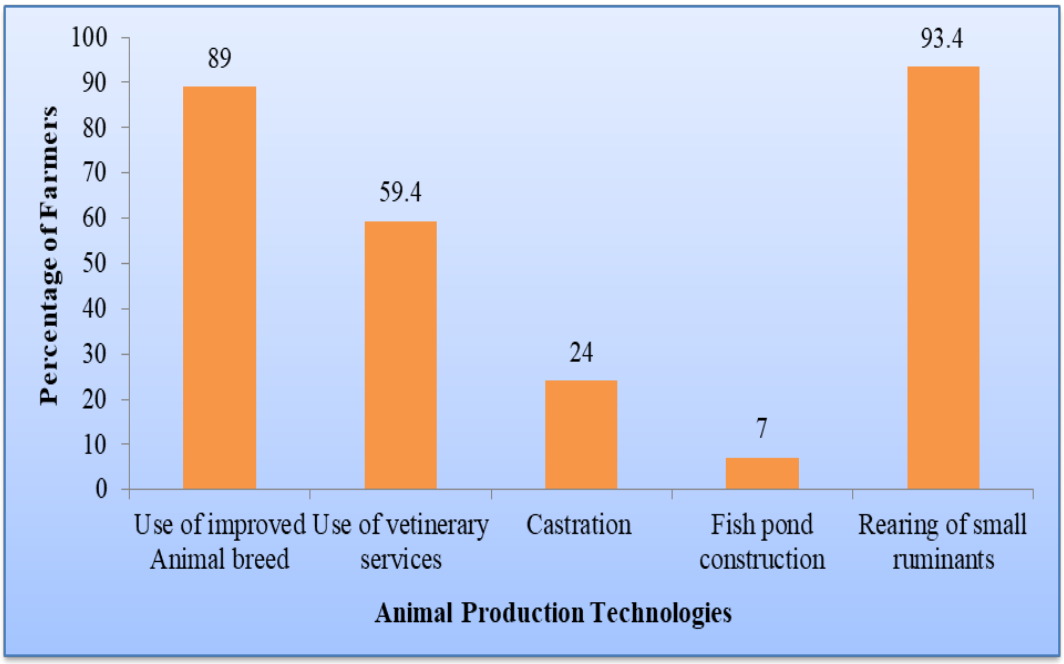

Figure 4. Animal Production Technologies Adopted by Farmers

Levels of Adoption of Agricultural Extension Technologies

Land Preparation: Figure 5 describes farmers' levels of adoption of land preparation technologies. Regarding ox-plough, 50% each of the farmers indicated "low" and "high" adoption. In the case of power tiller, 40% of the farmers indicated "low" adoption, 35% indicated "moderate" adoption and 25% high adoption (Figure 5).

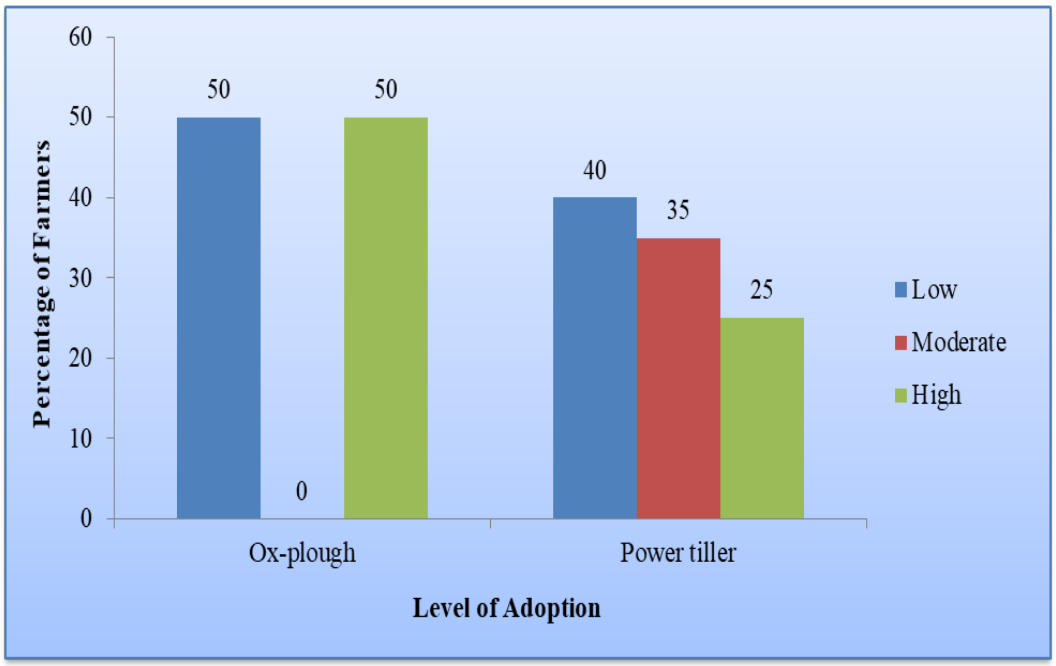

Figure 5. Farmers' Levels of Adoption of Land Preparation Technologies

Crop Management: Figure 6 illustrates farmers' levels of adoption of crop management technologies. The hunting technology was adopted highly by all of the farmers. Further, a majority of farmers indicated "high" adoption of high yielding crop varieties (95.5%) and short duration varieties (61.9%). Fewer farmers adopted moderately swamp development (33.8%) and organic manure (20%) (Figure 6).

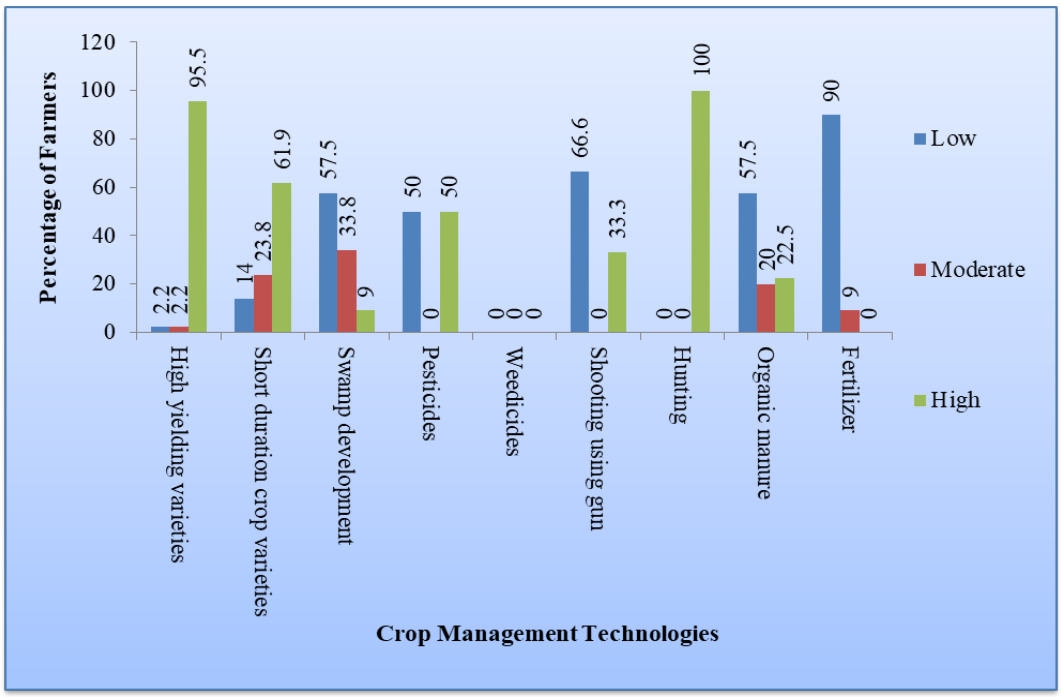

Figure 6. Farmers' Levels of Adoption of Crop Management Technologies

Crop Processing: Figure 7 illustrates farmers' levels of adoption of crop processing technologies. A majority of farmers indicated "low" adoption of foo-foo dewetters (92.3%), oil pressers (87.5%), hullers (78.9%), hand threshers (66.6%), and palm kernel nut crackers (62.1%). Moderate level adoption of crop processing technologies were recorded for hand thresher (33.4%), palm kernel nut crackers (24.1%) and huller (21.1%) (Figure 7).

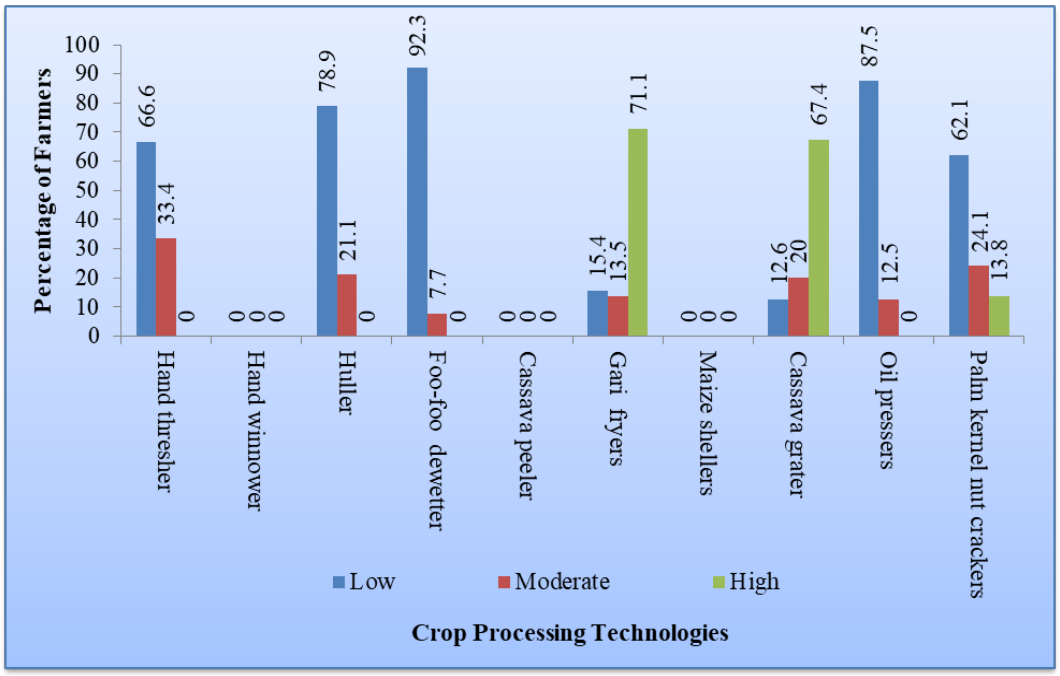

Figure 7. Farmers' Levels of Adoption of Crop Processing Technologies

Animal Production: Figure 8 illustrates farmers' levels of adoption of animal production technologies. All of the farmers highly adopted the fish pong construction technology. A majority of farmers (86.4%) reported low level adoption of veterinary services and castration (57.1%). A moderate level of adoption was recorded by 46.3% of the farmers of improved animal breeds (Figure 8).

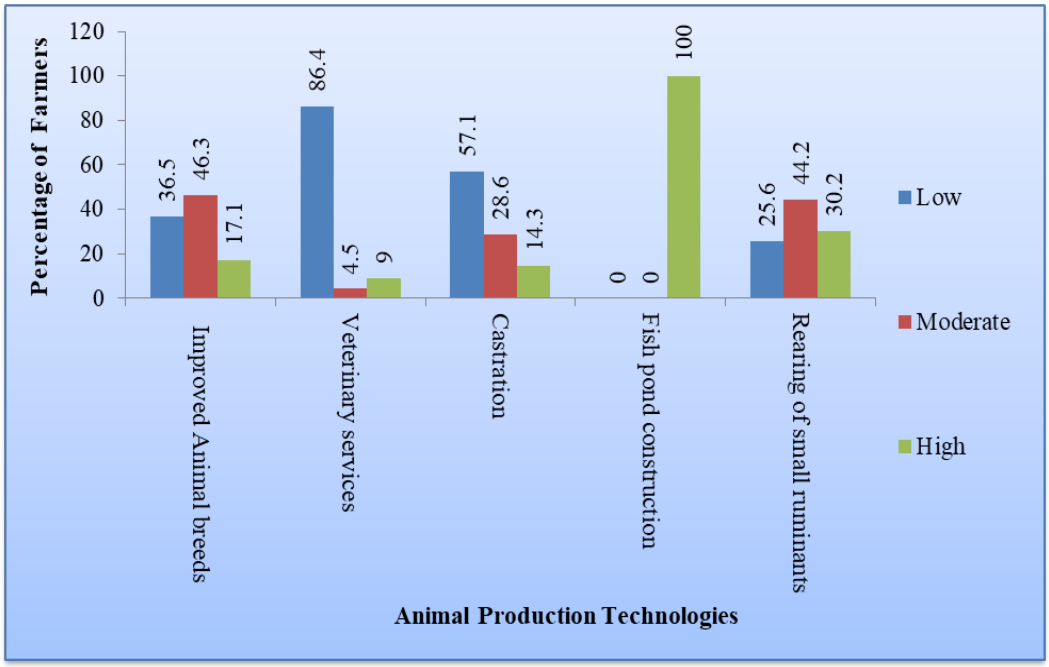

Figure 8. Farmers' Levels of Adoption of Animal Production Technologies

Impact of Agricultural Extension Technologies on Food Production

Land Preparation: Figure 9 illustrates the impact of land preparation technologies on food production. The figure reveals that 84.7% of the farmers reported reduced experiences of tiredness, 80.4% said planting areas increased and 72.2% claimed farming activities were sped up. A slight majority of farmers reported reduced pest attacks (58.7%) and improved yields (56.5%) (Figure 9).

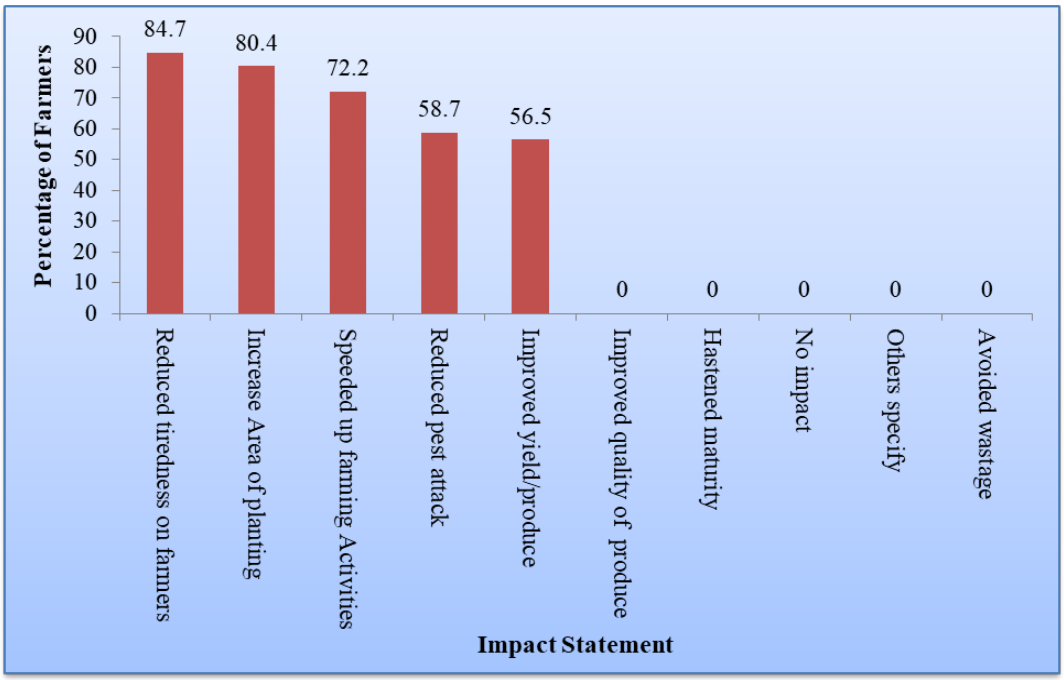

Figure 9. Impact of Land Preparation Technologies on Food Production

Crop Management: Figure 10 describes the impact of crop management technologies on food production. The figure reveals all of the farmers (100%) believed crop management technologies improved their crop yields. A majority of farmers indicated that crop management technologies hastened crop maturity (76.1), improved the quality of produce (73.9%) and helped in avoiding wastage (63%). Only 41.3% of farmers claimed crop management technologies pest attacks on crops (Figure 10).

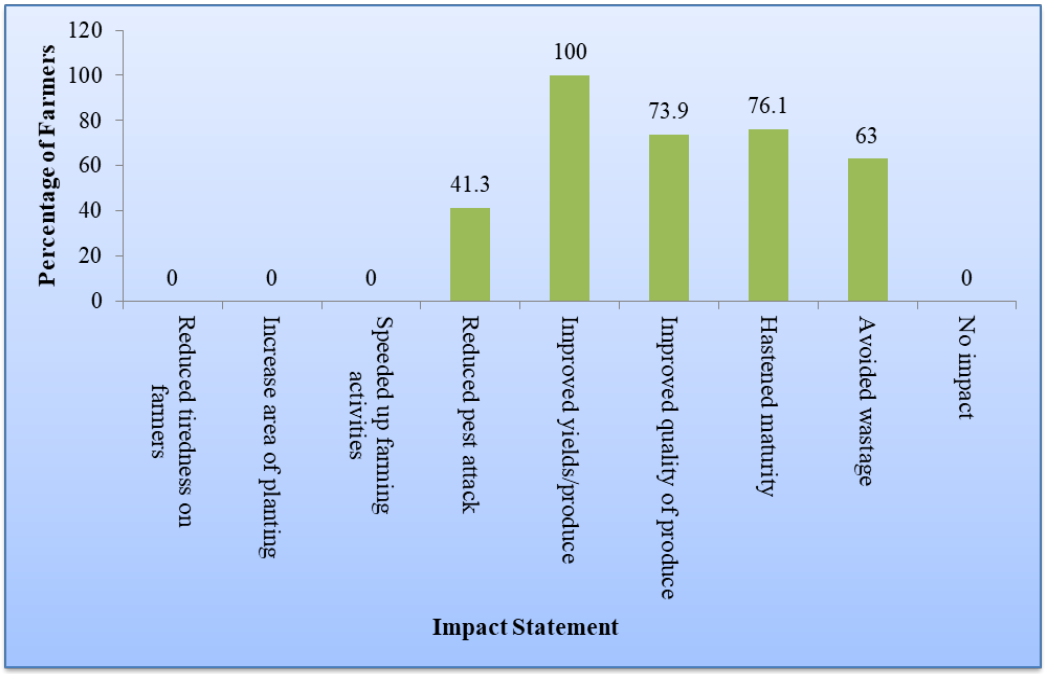

Figure 10. Impact of Crop Management Technologies on Food Production

Crop Processing: Figure 11 describes impacts of crop processing technologies on food production. All of the farmers (100%) claimed crop processing technologies improved the quality of produce and helped in avoiding wastage. Further, 87% of farmers said crop processing technologies reduced experiences of tiredness and 50% reported reduced pest attacks (Figure 11).

Figure 11. Impact of Crop Processing Technologies on Food Production

Animal Production: Figure 12 illustrates the impact of animal production technologies on food production. Most of the farmers reported that animal production technologies improved the quality of produce (84.7%), improved produce (80.7%), hastened maturity (73.9%) and reduced pest attacks (71.7%). Further, 52.2% of farmers said animal production technologies helped in avoiding wastage (Figure 12).

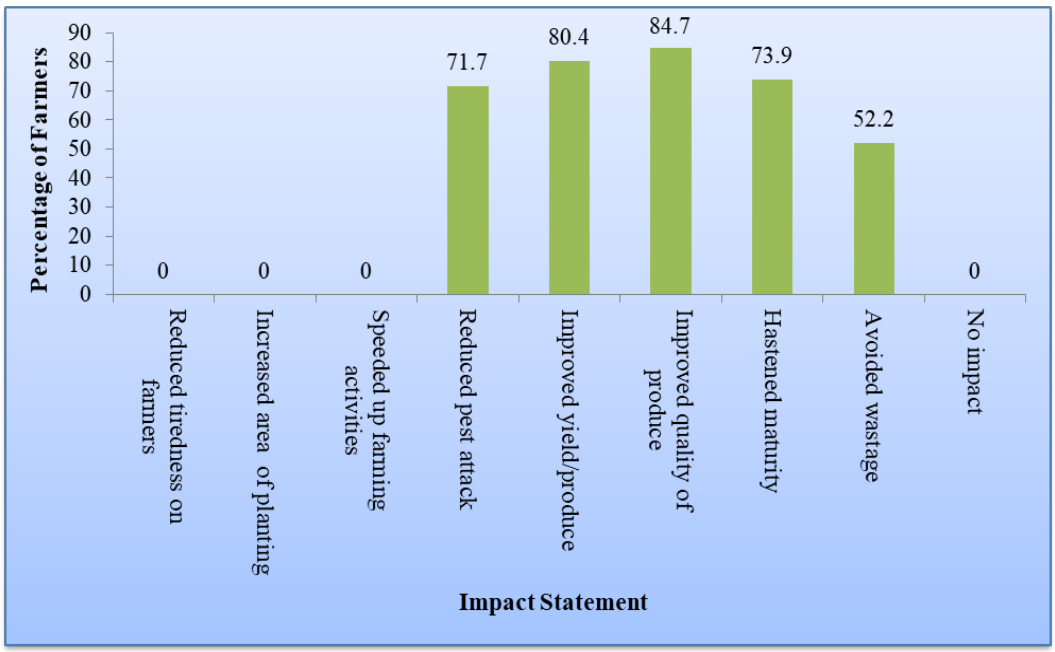

Figure 12. Impact of Animal Production Technologies on Food Production

The level of adoption of the ox-plough by farmers was not encouraging because most farmers resented the use of animals as a source of power. The use of the power tiller, which was preferred by a majority of the farmers, was widespread in the entire chiefdom. However, low-level adopters outnumbered both the moderate and high level adopters. The low-level adoption rate cannot be unconnected to the socio-economic conditions of farmers. Even though, the farmers were willing to use power tillers, the ability to acquire the land preparation technologies was limited because the cost of the technology was mostly beyond most farmers' means. The levels of adoption of various crop management technologies were alarmingly low. There were more low-level adopters of the technologies. Even though high yielding and short duration crop varieties in addition to hunting were highly adopted, 7 other crop management technologies received low level adoptions. Apparently, most farmers preferred using high yielding and short duration crop varieties. Low level adopters of animal production technologies outnumbered both the moderate and high level adopters. The adoption of small ruminants was however higher, but farmers generally employed free range methods to raise the animals.

The adoption of animal husbandry practices that involved high investment is often not very attractive to most small scale farmers. Like crop management technologies, many of the farmers who adopted the crop processing technologies reported low level adoptions. Only gari fryers and cassava graters were adopted highly. Fryers and graters are important AETs for processing cassava into gari and foo-foo. Cassava products are close substitutes to rice, the main staple food of Sierra Leoneans. Cassava and its products have gained national recognition and acceptance. High demands for cassava products account for the high production rate of the crop, which eventually, hence high acquisition of processing equipment.

Land preparation technologies created some positive impact on food production activities in the Jong Chiefdom. Even though adoption levels were generally low, land preparation technologies helped to reduce tiredness farmers usually experience using traditional land preparation tools and equipment. The study also revealed that planting areas increased, pest attack reduced and yields and quality of produce improved due to the adoption of land preparation technologies. Crop management technologies, such as the use of fertilizers and organic manure, also increased as well as improved quality of products. The farmers who adopted crop management technologies experienced increase in yield and improvement in quality of crops. The technologies also hastened crop maturation and helped in avoiding wastage.

Crop processing technologies adopted had positive impact on farmers and food production. For example, tiredness resulting from drudgery, pest attacks on crops and wastage were minimized. Reducing tiredness could helped farmers stay at work for longer hours. Where crop processing is done by large number of family members or hired labour, much of the produce is lost as every individual involved in the processing always aims at keeping some of the processing produce for their personal use apart from the general enumeration stated for all hired labour. The use of technologies like the threshers or cassava grater reduces the number of persons engaged in the processing exercise thus cutting down wastage.

The adoption of new animal production technologies improved significantly the rearing of farm animals in the Jong chiefdom. The use of veterinary services helped to reduce the mortality rate of the livestock population. Prompt treatment of farm animals infected by diseases and pests helped to increase the number of animals reaching maturity. The use of these technologies resulted in high production of animal products and improvement of quality.

Conclusions

Agricultural Extension Technologies Adopted

More farmers used power tillers than ox-plough for land preparation. The farmers adopted technologies involving hunting, high yielding crop and short duration crop varieties and organic manuring to manage their crops. They used cassava graters, gari fryer, hullers and palm kernel nut crackers and other crop processing machinery. Most farmers reared small ruminants and used improved animal breeds and veterinary.

Levels of Adoption of Agricultural Extension Technologies

Farmers reported low and high adoption for each of the ox-plough technologies and most farmers claimed low or moderate adoption of power tiller. The hunting technology was adopted most followed by a high adoption of high yielding crop varieties and short duration varieties. Farmers reported low adoption of foo-foo dewetters, oil pressers, hullers, hand threshers, and palm kernel nut crackers. They all claimed adopting fish pong construction technology and most reported low level adoption of veterinary services and castration.

Impact of Agricultural Extension Technologies on Food Production

Majority of farmers reported experiencing less tiredness and increasing their planting areas and farming activities. They indicated that there was improvement in crop yield, crop maturity, produce quality and waste management. Crop processing and animal production improved remarkably. In the case of animal production, notable results were reported in the quantity, quality and maturity of livestock.

Recommendations

Even though technology adoption was low among majority of the farmers, however, there is a felt need for the new technologies. Accordingly, providers of AETs in the Jong Chiefdom should entertain no fear in the introduction of pertinent technologies to farmers. To reverse low adoption of technologies, farmers should be given incentives to motivates them expand farming activities, which would eventually increase the need for them to adopt available technologies. The introduction of AETs to farmers has made it possible to increase farming output considerably. Farmers are therefore encouraged to double their efforts to adopt as many AETs as possible.

Conflicts of interest: The authors declare no conflicts of interest.

References

1. Food and Agriculture Organization (FAO). 2010. Sierra Leone. Retrieved from http://webcache.googleusercontent.com/search?q=cache:tpkcYmCICg8J:www.fao.org/isfp/country-information/sierra-leone/ru/+FAO+Sierra+Leone+2008&cd=1&hl=en&ct= clnk&gl=us

2. Harrison, P. 1980. The third world tomorrow. Harmondsworth, UK: Penguin.
3. Jayne, T.S., Yamano, T., Weber, M.T., Tschirley, D., Benfica, R., Chapoto, A. and Zulu, B. 2003. Smallholder income and land distribution in Africa: implications for poverty reduction strategies. Food Policy, 28(3): 253-275.
4. Moriba, S., Kandeh, J.B.A. and Edwards, M.C. 2011. Diffusion of technologies by the Tikonko Agricultural Extension Centre (TAEC) to farmers of the Tikonko Chiefdom in Sierra Leone: Impacts, problems, proposed solutions, and an updated outlook. Journal of International Agricultural and Extension Education, 18(3): 45-60.
5. Rogers, E.M. 2003. Diffusion of innovations. 5th edition. New York, NY: Free Press.
6. Thomas, A., MacCormack, V.M. and Bangura, P.S. 2006. Republic of Sierra Leone 2004 population and housing census: Analytical report on population size and distribution age and sex structure. Freetown, Sierra Leone.
7. United Nations Industrial Development Organization (UNIDO). 1979. Conceptual and policy framework for appropriate industrial technology: Monograph on appropriate industrial technology No. 1. New York, NY: United Nations.
8. World Bank. 2014. IDP living standards and livelihoods project. The World Bank Group. Retrieved from http://www.worldbank.org/projects/P122943/idp-living-standards-livelihoods-prj?lang=en

Citation: David A. Mansaray, Saffa Barbee Massaquoi and Susan Sia Quee. 2021. Adoption and Impact of Agricultural Extension Technologies in the Jong Chiefdom, Bonthe District, Southern Sierra Leone. International Journal of Recent Innovations in Academic Research, 5(5): 8-18.