

Influence of Selected Extension Support services on Sesame Production Among Smallholder Farmers in Bal'ad District, Somalia

Mohamed Hassan Mohamed^{1*}, Justus M. Ombati¹, Abdullahi Farah Ahmed²

¹Department of Agricultural Education and Extension, Egerton University,
PO Box 536-20115, Njoro, Nakuru, Kenya

²Faculty of Agriculture and Environmental Science
Somali National University

P.O Box 15 Mogadishu, Somalia

*Corresponding author email: mhassantall15@gmail.com

doi: <https://doi.org/10.37745/ijaerds.15/vol11n14660>

Published May 26, 2024

Citation: Mohamed M.H., Ombati J.M., Ahmed A.F. (2024) Influence of Selected Extension Support services on Sesame Production Among Smallholder Farmers in Bal'ad District, Somalia, *International Journal of Agricultural Extension and Rural Development Studies*, Vol.11, No.1, pp.46-60

ABSTRACT: *Sesame is valuable cash crop in Somalia, as a significant income source for smallholder farmers. Its cultivation and trade make substantial contributions to the national economy, generating revenue and creating employment opportunities. Farmers face challenges related to poor-quality seeds, limited fertilizers, and a lack of proper pest control practices. The paper was to investigate the influence of selected factors (access to farm inputs, access to credit, and access to market information) on sesame production among smallholder farmers in Bal'ad district/Middle Shabelle/Somalia. The target population was 3098 sesame farmers. Purposive sampling and simple random sampling were used to select a sample of the respondents. The sample size was 148 farmers. The study used both quantitative and qualitative methods. Descriptive and inferential statistics were used to analyze the data. The paper recommends that extension support services should guarantee that access to inputs of sesame production is available and offered to new farmers.*

KEYWORDS: Influence, extension support services, sesame production, smallholder farmers

INTRODUCTION

Agriculture is a major employment activity and the largest economic sector in the country, contributing more than 65% to the national GDP from domestic distribution and exports. Livestock

and crops are the main sources of economic activity, employment, and exports, with agriculture accounting for approximately 75% of Somalia's gross domestic product (GDP) and representing 93% of total exports (Ahmed, 2018). Sesame is a significant crop in Somalia, ranking third in production after sorghum and maize, known locally as Sisin, emerging as one of the most vital cash crops. This resilient plant thrives in the arid conditions prevalent in Somalia, requiring minimal management, which makes it suitable for cultivation by smallholder farmers. Despite its adaptability and the high oil content that makes it a valuable export, particularly to markets like Middle East (Turkey, UAE, Iran) and China, the production of sesame in Somalia has not reached its full potential. The use of poor-quality seeds has resulted in yields as low as 350–420 kg/ha, significantly less than the 1000 kg/ha achieved in other countries. Enhancing agricultural practices through extension services, investing in better management, and exploring new markets could unlock the untapped potential of sesame cultivation, bolstering the economy and providing a sustainable livelihood for many Somali farmers (Hassan Y., 2017). These services can provide vital knowledge transfer, input support, financial access and market information, which are crucial for enhancing productivity and livelihoods. Over the years. Extension services in Somalia are typically organized through a combination of government agencies, non-governmental organizations (NGOs), agricultural cooperatives, and community-based organizations. These entities worked together to deliver agricultural information, training, and assistance to smallholder farmers, including those involved in sesame production. Furthermore, the extension services aimed to address the specific needs of smallholder sesame farmers by providing them with resources and knowledge to improve their farming practices. They offered guidance on selecting and obtaining quality seeds, implementing appropriate farming techniques, managing pests and diseases, accessing credit facilities, and navigating the market for sesame produce (Odhiambo, Karira & Mohamed, 2024).

The study was conducted in Bal'ad district, middle Shabelle region, Somalia, as a showcase for the influence of selected extension support services on sesame production by smallholder farmers such as farm inputs, credit, and market information. The research attempted to answer the questions that are related to the gap in accessing selected factors in the district.

The study focused on the challenges faced by smallholder sesame farmers in Bal'ad district, Middle Shabelle region, Somalia. It specifically addresses the issues of limited access to farm inputs, such as quality seeds, as well as the challenges in accessing credit and market information. The study aims to provide insights into these challenges and recommend interventions to improve the situation for smallholder sesame farmers in the region.

Agricultural extension services are recognized as important to the smallholder farming sector worldwide. It is argued that the provision of agriculture support services can strengthen

smallholder farmers' production abilities through access to advice, information, inputs, credit, markets, and related services (Gereharan et al., 2019).

The study confined itself to investigation on influence of selected extension support services among smallholder sesame farmers in Bal'ad district, Somalia. The selected factors included access to input (improved seeds, agro-chemicals), access to credit services and access to market information. In comparison to the levels of sesame production prior to the civil war in 1991, the current quantities of sesame produced remain below the anticipated yield. The pre-war production stood at 57,000 tonnes, whereas in 2019, it amounted to 26,210 tonnes. In an effort to enhance sesame production in the country, the government has taken steps to enhance agricultural extension services. This includes granting permission to various agricultural extension providers and fostering a conducive environment for private and non-governmental organizations to offer support services. Despite the various extension services and training programs offered by numerous institutions in Somalia, there is scant information on their impact on the output and productivity of farmers. Consequently, this study has been initiated to address this knowledge gap and provide insights into the effectiveness of these initiatives.

Therefore, the objective of this study was to investigate the influence of selected extension support services (access to inputs, credit, and market information) on sesame production by smallholder farmers in the Bal'ad district of Somalia's middle Shabelle region, to improve production. To achieve the objectives of this study, data was collected from 148 farmers in ten villages in Balcad district of Middle Shabelle region of Somalia.. The findings of this research would be used by a variety of partners, including NGOs (both local and international) and the business sector, to expedite and improve the effectiveness and efficiency of their activities. It may also assist agricultural officials in developing appropriate policies and agendas for smallholder sesame growers at the state and national levels by utilizing data.

Extension services in Somalia are typically organized through a combination of government agencies, non-governmental organizations (NGOs), agricultural cooperatives, and community-based organizations. These entities work together to deliver agricultural information, training, and assistance to smallholder farmers, including those involved in sesame production. Furthermore the extension services aim to address the specific needs of smallholder sesame farmers by providing them with resources and knowledge to improve their farming practices. They offer guidance on selecting and obtaining quality seeds, implementing appropriate farming techniques, managing pests and diseases, accessing credit facilities, and navigating the market for sesame produce.

LITERATURE REVIEW

Evolution of agricultural extension services in Somalia

According to Jimale (2020a), agricultural extension services were initiated in Somalia in 1954, and the establishment of the first agricultural research station took place at Bonka Research Station in the Baidoa district, located in the Bay region. Following the country's independence in 1960, additional agricultural advisory centers were established in the lower Juba and lower Shebelle regions, as well as in the Northwest region. Since the dissolution of the previous central government in the early 1990s, international organizations and local community-based organizations have been actively involved in supporting the sesame sector in Somalia. The Ministry of Agriculture and Irrigation, under the federal government, is the prominent agricultural institution, but faces limitations due to limited access to sesame farms and lack of resources. Despite these challenges, the assistance provided by international organizations and local community-based organizations has been instrumental in introducing new varieties and promoting the sector.

However, private extension providers have limited interaction with smallholder farmers and lack logistical and supervisory support. The training of public and private personnel is consistently undertaken by professional extensionist funded by external donors. In the 1970s and 1980s, the Somali government placed a high priority on developing skilled extension agents to improve productivity and food security. Following the civil war, the agricultural advisory system has played a vital role in post-conflict development, with institutions making investments in it since the 2010s.

Sesame production by smallholder farmers in Somalia

According to WORLD BANK and FAO estimates from 2018, Somalia's sesame production peaked at around 57,000 tons in 1982. In 2014, the country produced roughly 60,000 tons of sesame, producing an estimated \$300 million in revenue. However, output fell significantly in 2015, with earnings falling to roughly \$34 million. However, Production and revenue fluctuated in future years. Somalia gained \$5.62 million in 2017 and \$19.5 million in 2018, shipping 13,797 tons of sesame seeds. Notably, in 2018, production eclipsed the highest levels observed in the 1980s, when 15,000 tons, or over a quarter of total production, were exported, producing \$81.2 million in export revenue (SATG, 2016).

Sesame seeds have multiple uses in Somalia. They are widely used in Somali cuisine to enhance flavor and texture in dishes like soups and salads. Additionally, sesame oil is used in cooking and as a flavoring agent. In traditional medicine, sesame seeds are believed to have health benefits and are used in remedies. Sesame seeds also find applications in baking, livestock feed, cosmetics,

industrial production, and as a valuable export crop contributing to the country's economy (Abdullahi, 2022).

There is a paucity of understanding of how smallholder farmers view their farming needs and how they respond to top-down extension services. The study intended to assess the impact of chosen extension support services on sesame production, such as inputs, credit, and market information.

Quantity of sesame production in Somalia

Approximately 80 percent of sesame production occurs in the Lower and Middle Shabelle regions and the Middle Juba region, with smaller, localized production in the northwestern part of Somaliland. Sesame demonstrates excellent adaptability to the geographical and climatic conditions prevalent in these areas (Sidow, 2010). The production of sesame reached its pinnacle in 1982 and 1985, with an output of approximately 57,000 tons, before experiencing a decline to 45,000-50,000 tons in 1989-90, just prior to the onset of the civil war. Subsequent to the collapse in the early 1990s, production volumes stood at 38,133 tons in 2013, declining further to 35,584 tons in 2014 and 28,640 tons in 2015, as reported by the FSNAU. However, the SATG estimates that production surged to 60,000 metric tons by 2014, surpassing the peak production levels of the 1980s. Out of this, around 15,000 metric tons (equivalent to approximately a quarter of the overall output) were exported (SATG 2015). The estimated value of such production is approximately \$300 million, according to the World Bank and FAO (2018).

In the year 2019, Somalia successfully exported a total of 28,672 tons of sesame seeds. Notably, within that same year, there was a remarkable surge in demand for Somalia's sesame seeds, experiencing a significant increase of 107.528 percent when compared to the preceding year, 2018. Moreover, between the years 2017 and 2019, the country witnessed a substantial growth of 311.89 percent in sesame exports, resulting in noteworthy revenue of US\$43.03 million (Salina Wamucii, 2020). This positive trend is further bolstered by the fact that Somali sesame is highly regarded for its exceptional quality and commands favorable international prices, thus solidifying its position as an increasingly significant cash crop for export (Jaspars et al., 2019).

Access to Agricultural inputs and smallholder sesame production

One major challenge on the supply side has been the struggle of smallholder farmers in Bal'ad district's sesame value chain to access top-quality agricultural inputs for maintaining output levels. This underscores the importance of enhancing quality control and encouraging the use of certified seeds, fertilizers, and pesticides. To address the low sesame output, both the private sector and government need to intervene to guarantee the availability of quality inputs for higher productivity. A key factor contributing to low production, as highlighted in the earlier issues, is the lack of training (UNIDO, 2016).

Moreover, the positioning of input shops in urban centers, distant from agricultural lands, poses a significant obstacle for farmers seeking access to essential inputs that can enhance crop production. These inputs play a crucial role in improving agricultural output, particularly among smallholder farmers, who contribute to over 90 percent of agricultural production and cultivate more than 95 percent of the total land area dedicated to farming (Geneti et al., 2017).

Equipping these smallholder farmers with relevant information enables them to make informed decisions regarding the selection of appropriate inputs from a diverse range of options, such as improved seeds and agricultural chemicals, which can be applied to their farms. By making informed choices, farmers can optimize their yields and secure favorable market opportunities (Makawia, P. 2018).

Insufficient access to improved inputs and technologies, coupled with an imperfect market structure for input and output, contributes to low agricultural productivity. However, the adoption of modern farming techniques has the potential to effectively double productivity levels (Yeshitila et al., 2020). In developing countries, the funding of public extension services has been facilitated by donor-supported projects over the course of several decades, thus assisting in addressing these challenges (Ugochukwu & Chinyelu, 2020). Input suppliers play a crucial role in providing farmers with approximately 95 percent of the necessary information, drawing upon their knowledge and skills acquired through interactions with representatives from fertilizer or pesticide companies. On the other hand, extension officers contribute approximately 56 percent of the information required for effective production (Padmaja & Duche, 2016).

In the context of Somalia, the Humera sesame variety holds a prominent position in the international market due to its favorable attributes. This particular variety exhibits an average oil content of 55%, surpassing the Dunyar variety, which stands at 45% (Bubbolini et al., 2016). An experiment conducted by SATG in Afgoi during the Haggaa season (July-September 2016) involved the evaluation of various sesame varieties, including Humeera, Abasen, Setit, Nigerian, the local Somali variety, and Yemeni. The findings of the experiment highlighted notable differences in terms of plant height. The local variety emerged as the tallest, measuring 95.25 cm, while the Abasena variety was the shortest, measuring 67.00 cm. Conversely, the Humera, Setit, Nigerian, and Yemeni varieties exhibited heights of 73.75, 82.00, 69.75, and 84.75 cm, respectively (Ismaan et al., 2020). Enhancing the quality of local sesame seed varieties assumes a crucial role in sesame production, ultimately leading to an increase in market prices (Osman & Theuri, 2016).

METHODOLOGY

This study was conducted on Bal'ad district, Middle shabelle, Somalia. The study was carried out in the ten villages of Kooreeb bari, Raqayle, Maqdas, Kulmis yarow, Mukidhere, Farbaraki, Mukidherebari, Damaleey, Jameeco, and Gaashaanle, which belong to Bal'ad district. (OCHA, 2015). The study targeted 3098 farmers from the ten villages from which the sample for the study was chosen using simple random sampling. Purposive sampling was used to select the location of the study.

Purposive sampling was used to select the location of the study. Out of the 91 districts in Somalia, Bal'ad was chosen for the study. The district was considered for the study because it is one of the districts that produces large quantities of sesame and has almost 30 villages of sesame producers. Simple random sampling was used to narrow the field down to ten villages, from which the sample for the study was chosen. Table 1 presents the sample size by proportion.

Table 1
Sample size

Village	Number of Sesame Farmers	Proportion	Sample Size
Kooreeb bari	177	6	9
Raqayle	616	20	30
Maqdas	904	29	43
Kulmis yarow	366	12	18
Mukidhere	218	7	10
Farbaraki	227	7	10
Mukidhere bari	186	6	9
Damaleey	125	4	6
Jamee'o	152	5	7
Gashanle	127	4	6
Total	3098	100	148

A questionnaire and an interview guide were used for data collection. The questionnaire was piloted in Afoi district, which has similar agricultural conditions to those in Bal'ad district. A sample of 30 respondents was used for the piloting of the instruments. The Cronbach Alpha's test for reliability was used in establishing the reliability of the instrument. The instrument was deemed unreliable if a reliability coefficient of less than 0.7 was obtained, and it was revised accordingly. The questionnaire was designed to get relevant information about the influence of selected extension support services on sesame production from the smallholder farmers. The options of 'tick (☑)' was employed in some parts of the questionnaire for getting responses from respondents. Open spaces were used to record the answers from the respondents to obtain more information as per their views. The interview guide was used to obtain data from key informants. The target respondents for the key informant interviews were extension service providers, subject matter experts, and local authority officials.

The data collected was cleaned and organized before being analyzed. It was organized into various categories that were different from each other, and through coding, the data were then analyzed using SPSS version 22. Based on the objectives of the study and the nature of the data available, descriptive statistics such as x percentages, frequencies, and mean square and inferential statistics such T-test were used to analyze the influence of accessing inputs, credit, and market information on sesame production.

FINDINGS OF THE STUDY

Response rate of the study

The study shows the response rate for the questionnaires provided to sesame producers who participated in the research. In Table 2, a total of 148 questionnaires were thoroughly designed and distributed to the sampled individuals. Out of these, 145 questionnaires were successfully completed and returned, yielding a 98% response rate.

Table 2: Response Rate of the respondents

Response Rate	Frequency	Percent
Responses	145	98
No response	3	2
Total	148	100.0

Access to farm inputs of the respondents

The primary aim of this study was to evaluate the range of inputs provided to producers. The results indicated in Table 3, that 60% of the participants had successfully obtained access to farm input

services, while the remaining 40% faced limitations in accessing such services. The purpose of this analysis was to obtain a comprehensive understanding of the distribution and availability of crucial agricultural inputs among the surveyed producers. By examining these findings, valuable insights can be gained regarding the effectiveness and reach of input provisioning systems, thereby informing strategies to enhance access and ensure equitable distribution of essential agricultural resources.

The SD=14.5

Pooled proportion

$$\frac{87 \cdot 0.60 + 58 \cdot 0.40}{87 + 58} = 0.52$$

$$SE = \sqrt{\frac{0.52 \cdot (1 - 0.52)}{\frac{1}{87} + \frac{1}{58}}}$$

SE=0.74

The difference in proportions is statistically significant meaning there is a significant difference in the proportions of access to farm inputs between the two groups. One group easily access farm inputs while the other is not advantaged.

Table 3: Access to farm inputs of the respondents

Access to farm inputs	Frequency	Percentage	SD	Mean
Yes	87	60%	21	72.5
No	58	40%		
Total	145	100.0		

Farm inputs accessed by the respondents

The primary objective of this study was to determine the specific types of farm inputs utilized by sesame farmers to enhance their production outcomes. The findings, summarized in Table 4, provide a comprehensive overview of the farm inputs accessed by sesame producers. The data indicates that 33% of the respondents had access to tractors, 28% utilized chemicals, 22% employed improved seeds, 12% utilized irrigation systems, and 6% relied on labor.

The results from the questionnaires revealed that sesame producers demonstrated the capability to access tractors, either through donations to the village or by acquiring them at reasonable prices. This access to tractors plays a vital role in land cultivation and preparation, contributing to improved production outcomes. The availability of these farm inputs can be attributed to the accountability and accessibility of extension support service providers.

Table 4: Farm inputs accessed by the respondents

Farm inputs	Frequency	Percentage	SD	Mean
Improved seeds	48	22%	<u>16</u>	<u>29</u>
Chemicals	40	28%		
Tractors	32	33%		
Irrigation	17	12%		
Labour	8	6%		
Total	145	100.0		

Farm inputs required when smallholder producing Sesame in Bal'ad district

The study also aimed to identify the agriculture inputs necessary to grow sesame. This was done to determine the precise inputs that should be incorporated prior to sesame manufacturing. Table 5 summarizes the findings. In determining which farm inputs sesame growers use for producing sesame, 48% required inorganic fertilizers such as DAP, 33% required organic fertilizers, 7% required herbicides, 7% required manpower, and 5% required pesticides. It was clear that the majority of growers preferred fertilizers to aid enhance yield and sesame growth.

The majority of the land in the area is unviable without the use of fertilizers, which is why extension services strive to reach all producers by supplying the necessary fertilizers. (Noor et al., 2020).

Table 5: Farm inputs required when smallholder producing Sesame in Bal'ad district

Farm inputs required - Frequency	Percentage	SD	Mean
Organic fertilizer	49	33%	<u>29</u>
In organic fertilizer	70	48%	<u>29</u>
Pesticides	7	5%	
Herbicides	10	7%	
labourers	9	6%	
Total	145	100.0	

Additionally, the researcher conducted an interview with banks, NGOs, cooperatives, input Suppliers Companies and district extension officers as extension service providers. The target respondents for the key informant interviews were extension service providers, subject matter experts, local authorities and other key informants. The administering of the key informant's interview was guided by the researcher.

However, most of the interviewees felt that the NGOs don't go to these villages because of insecurity, but the farmers are called into town and then they are given some inputs. Some think they don't give them input, but we give the market only when they come to our places and call us, which isn't often.

It was found that they had different opinions on that, meaning most of the farmers needed to put in more effort to access the extension support services even though they were available. Furthermore, The results of the interview schedule revealed that some agricultural extension services, such as farm inputs, are sold to smallholder sesame farmers, but most beneficiaries are large-scale farmers who get the services for free, at no cost, or low cost. Other results from the interviews received were that NGOs selected some farmers to come to Bal'ad district or Mogadishu's capital city. This meant that the most beneficiary sesame producers were those that practice on a large scale.

DISCUSSIONS

The purpose of the study was to investigate the influence of selected factors (accessing inputs, credit, and market information) on sesame production by smallholder farmers in the Bal'ad district, in the middle Shabelle region of Somalia, so that improved production could be realized. The study used both quantitative and qualitative methods to collect data from farm households on the influence of selected factors on sesame production.

The study aimed to assess the availability and distribution of agricultural inputs among producers, and the results indicated that 60% of participants had access to farm input services, while 40% faced limitations in accessing these services. The study also examined the specific inputs required for sesame cultivation; with 48% of growers using inorganic fertilizers such as DAP. The findings highlighted the importance of fertilizers in enhancing sesame growth and yield. The study further explored the mechanisms through which smallholder farmer's access agricultural extension support services, revealing challenges such as limited access to loans for small-scale farmers and the need for farmers to travel to urban centers to access farm inputs and market information. Challenges faced by extension service providers included inadequate infrastructure, insecurity, and market instability. The study recommended strategies to enhance access to extension support services, including reducing loan requirements and improving security. The government was urged to provide public funds and establish irrigation channels. These findings and recommendations contribute to improving the distribution of agricultural resources and supporting sesame production in the Bal'ad district.

The study revealed that 60% of the participants were successful in accessing farm input services, indicating a positive outcome. However, the remaining 40% faced limitations, highlighting the need for improvement. Ensuring equitable distribution of inputs to all producers is crucial for fostering a sustainable and productive agricultural sector.

The T-test conducted to determine access to farm inputs yielded a p-value of 0.74, indicating that the disparity in proportions is statistically significant. This means that there is a notable difference in the proportions of access to farm inputs between the two groups. One group has convenient access to farm inputs, while the other group faces disadvantages in acquiring them. The interviews conducted with farmers revealed a range of challenges faced by extension service providers, including inadequate infrastructure, insecurity, and limited communication between traders and farmers. Addressing these challenges is crucial for improving the delivery of extension services and ensuring their effectiveness in reaching all producers, particularly those in rural areas.

Implication of the findings to research and practice

The implications to this research and practice highlight the actionable steps that can be taken to improve the agricultural practices and livelihoods of sesame producers in the Bal'ad district. By implementing the recommended strategies, policymakers, extension service providers, and farmers can work together to create a more inclusive, sustainable, and prosperous agricultural sector. The study recommended that sesame production should be practiced on a large scale since it's a common production practiced in the district and many people can earn a good living from it. According to the research, it is recommended that extension support services should guarantee that

access to information about sesame production is readily available and offered to new producers. It is also recommended that credit be offered to all smallholder producers rather than just large-scale producers. Market information should be available to all producers so that the produce does not overstay its welcome after harvest. Each village in the district should have a sub-extension service office to ensure all producers are served equally.

CONCLUSION AND RECOMMENDATION

The study highlights the importance of timely access to inputs for farmers in the sesame sector, particularly for smallholder farmers who lack credit. It suggests that larger-scale farmers can access credit more easily, highlighting the need for credit programs. Extension support services play a significant role in providing a ready market for sesame production, allowing farmers to sell their produce at higher prices. The study also found a significant difference in sesame yields based on input availability and quality. However, credit availability did not significantly influence sesame production levels. The study also highlighted the challenges faced by farmers in accessing market information, emphasizing the need for improved access to reliable and timely information. The findings underscore the significance of timely inputs, extension support services, and the impact of inputs and market information on sesame production.

The study's findings advocate for a comprehensive approach to bolster the sesame sector. It is imperative that extension support services maintain meticulous records of all farmers and ensure consistent distribution of agricultural inputs. To facilitate a robust start to the planting season, it is crucial to prioritize timely access to essential inputs. This necessitates coordinated efforts from agricultural bodies, including the Ministry of Agriculture and Irrigation, extension services, and NGOs, to implement targeted interventions like the prompt provision of seeds and fertilizers. Additionally, the study underscores the importance of establishing accessible credit facilities and farmers should receive extension and advisory services that are proportional to their scale of production. Moreover, other researchers could use the identified underlying factors to develop detailed survey instruments that measure the effectiveness of public, NGO and private extension services.

REFERENCES

- Abdullahi, A. A., & Arisoy, H. (2022). Agricultural structure in Somalia. *EURASIAN JOURNAL OF AGRICULTURAL ECONOMICS (EJAE)*, 2(1), 1-14.
- Ahmed, A. M. (2018). *Practising on-farm diversification and its contribution to food accessibility among smallholder farmers of Balcad district, Middle Shabelle region, Somalia* (Doctoral dissertation, Van Hall Larenstein).

- Cipolla, D., Benedettelli, S., Trucchi, B., & Romano, D. (2018). Sesame (Sesamum indicum) seed security and breeding programme to improve resilience of small holder farmers in Somalia. *Science et Environnement*, 31.
- Connelly, P. J., Prentice, N. P., Cousland, G., & Bonham, J. (2008). A randomised double-blind placebo- controlled trial of folic acid supplementation of cholinesterase inhibitors in Alzheimer's disease. *International journal of geriatric psychiatry*.
- Conteh, A. R. (2020). Ensuring Quality Fertilizer for Farmers in Sierra Leone. *Journal of Agriculture and Veterinary Science*
- Hassan, Y. (2017). *Demonstration Plots: A Source of Innovation, Modern Technology and Skills for Farmers*.
- Ismaan, H. N., Isse, M. M., Siad, S. A., Islam, M. S., & Sidkar, S. I. (2020). Evaluation of new Sesame varieties for growth and yield performance in summer season in Afgoi, Somalia. *Journal of Agriculture and Veterinary Science*, 4
- Jimale, A. (2020a). *Exploring possibilities of using smartphones to deliver agricultural advisory services in Afgooye district -Somalia* [Master Dissertation]. Swedish University of Agricultural Sciences.
- Kubayo, K. (2009). *Analysis of agricultural input supply system: The case of Dale Woreda, Southern Nations, Nationalities and Peoples' Region*. Haramaya University.
- Longley, C., Jones, R., Ahmed, M. H., & Audi, P. (2001). *Supporting local seed systems in southern Somalia: A developmental approach to agricultural rehabilitation in emergency situations*. London: Overseas Development Institute.
- Makawia, P. (2018). *Agricultural information needs and their accessibility to sesame producers in morogoro district, tanzania* [Master Dissertation]. University of Agriculture. Morogoro, Tanzania.
- Maryama. (2015). The production of marketable seeds begins with the planting of pure seeds into arearing environment that assures optimum and rapid growth. This will allow harvest in the shortest possible time. *Satg Filsan*.
- Mavuthu, A. K. (2017). *Effect of the National Accelerated Agricultural Inputs Access Subsidy Program on Fertilizer Usage and Food Production in Kakamega County, Western Kenya* [PHD Dissertation]. Walden University
- Michael, A., Tashikalma, A., & Maurice, D. (2018). *Agricultural inputs subsidy in nigeria: an overview of the growth enhancement support scheme (GESS)*. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 66(3):
- MOAI, ASI, SATG, & EU. (2019). *Outreach Report_Sesame_KS.DOCX*.
- Musyoka, H. J. (2017). *Influence of socio-economic status on the access to agricultural farm inputs by small holder farmers in Yatta sub-county of Machakos county, Kenya*.

- Noor, R. S., Hussain, F., Abbas, I., Umair, M., & Sun, Y. (2020). Effect of compost and chemical fertilizer application on soil physical properties and productivity of sesame (*Sesamum Indicum L.*). *Biomass Conversion and Biorefinery*, 1-11.
- ODHIAMBO, F. J., KARIRA, W. J., & MOHAMED, I. (2024). SUPPORT FOR STRENGTHENING CLIMATE CHANGE ADAPTATION PLANNING FOR SOMALIA PROJECT.
- Omar, A. A. (2018). Assessment of Irrigation Water Supply Losses in Major Irrigation Canals in Bal'ad District of Middle Shabelle Region in Somalia.
- Omar, A. A., Omuto, C., & Ondieki, S. (2019). Determination of Irrigation Supply Efficiency in Challenging Environment Case Study of Bal'ad District, Middle Shabelle Region in Somalia. *Computational Water, Energy, and Environmental Engineering*, 8(01), 1.
- Osman, H., & Theuri, F. (2016). *Factors Influencing Production of Sesame Seeds in Somalia (Case Study: Jowhar and Bal'ad District Farmers, Middle Shabelle Region)* [Master Dissertation]. Jomo Kenyatta University of Agriculture and Technology.
- Peterman, A., Behrman, J. A., & Qisumbing, A. R. (2014). A review of empirical evidence on gender differences in nonland agricultural inputs, technology, and services in developing countries. *Gender in Agriculture*, 145–186.
- Ragasa, C., & Mazunda, J. (2018). The impact of agricultural extension services in the context of a heavily subsidized input system: The case of Malawi. *World Development*, 105, 25-47.
- Ragasa, C., Mazunda, J., & Mariam, K. (2016). *The Impact of Agricultural Extension Services in the Context of a Heavily Subsidized Input System*. International Food Policy Research Institute
- SATG. (2016). *Sesame in Somalia | SATG | Somali Agriculture Technical Group*. <https://satg.org/sesame-in-Somalia/>
- SEKO, K. K. (2009). *Analysis of agricultural input supply system: the case of dale woreda, southern nations, nationalities and peoples' region* [Master Dissertation]. Haramaya University.
- Siad, S. A., Ismaan, H. N., Isse, M. M., Mohamud, A. O., Islam, M. S., & Mohamed, A. E. (2021). Evaluation of New Sesame Varieties for Growth and Yield Performance during the Deyr Season in Afgoye, Somalia. *Asian Journal of Research in Crop Science*, 6(2), 1-7