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An Assessment of Cultural Factors and Adoption of New Green Gram Varieties by Famers in Soroti District

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Abstract

This paper investigates the relationship between cultural factors (education of the households (HH) head, religion of HH, eating habits, and perceived/cultural commercial crops) and adoption of new green gram varieties taking Soroti in Uganda as district study. A cross sectional design adopting both qualitative and quantitative approaches was utilized. From a population of 32,432 farmers, a sample of 395 respondents was randomly selected and this yielded a response rate of 65%. After taking cared of validity and reliability of instruments, data was collected using structured questionnaires and interview guide. Two data analysis computer packages included; SPSS version 22 and NVIVO11. The study results revealed that there is a significant negative relationship between cultural factors and adoption of new green gram varieties in Soroti district which was indicated by correlation coefficient ($r = -.131$, $p<0.05$). In addition, the regression analysis results show that the cultural factors explain 1.7% of the variation in adoption of green gram by farmers in Soroti district ($R2=0.017$). The regression model was significant at 5% (with the constant of 4.2; $p<0.001$ and the coefficient for cultural factors of -0.447, $p<0.05$). Results from the item mean analysis of cultural factors reveal that religion does not interfere with neither adoption of new green gram varieties nor use of farming practices, use of fertilizers and pesticides. It was revealed that local green gram varieties are perceived to be the most demanded and that green gram has been considered overtime as a major source of income. The results further indicated that the more farmers value their cultural beliefs on local green gram varieties, the less the new varieties will be adopted. The study recommends that research institutions promoting the new green gram varieties should liaise with local government officials and churches leaders to sensitize more about the new varieties. Evidence based of the benefits of the new varieties should be explained to farmers through demo plots or export market information.

Key words: *Adoption, New Green Gram, Cultural Factors, Soroti District*

Introduction

Green gram originates from India and Central Asia and has been grown in these regions since prehistoric times (Oplinger, 1990). The integrated breeding platform (2019), mentions that the domestication of green gram was located in Northern and Southern India 3,000 to 3,500 years ago. From India, the cultivation of Green Gram spread to China and other countries of Southeast Asia. The same platform reveals that green grams have been eaten in Thailand for at least 2,200 Years. Subsequently, the cultivated green gram was introduced to Southern and eastern Asia, Africa around the 9th or 10th century. The commodity is now widespread from sea level up to an altitude of 1,850 m in the Himalayas. Green Gram has recently gained popularity in the East African Countries as it serves as an alternative source of non-animal protein (Machocho, 2012)

Green Gram has been overtime consumed in the predominantly cereal-based diets of Asian especially in Indian and China, where 90% of global production currently occurs. It is regarded as a "green pearl" because of its high nutrient content. In Pakistan, pulses provide approximately 25% of all iron in the diet and Green Gram is one of the important pulse crops consumed by all households. Green Gram is also a comparatively low cost source of protein (Ramakrishnan, 2013) .

According to Kilimo Trust (2017), the dependency of India on imported legumes is expected to rise in near future. This gives opportunities to East African countries to tap into this market. This coupled with the increasing demand for non-animal proteins in the East African region mainly due to the ever-growing population. Despite the increasing importance of green gram, the average yield of 384 kg ha worldwide is very low. World green gram production is estimated to be on an area of 6 million hectares (Ramakrishnan, 2013).

Shanmugasundaram (2000) from the Asian Vegetable Research and Development Center (AVRDC) stipulates that green gram has relatively given minor research attention compared to cereals. Before 1971, green gram breeding programs were only operating in India, the Philippines and the U.S.A. Hence globally, the commodity's cultivars were subject to natural selection and this resulted into low yields cultivars. The establishment of AVRDC based in 1971/72 enabled the development of the interdisciplinary approach to green gram improvement.

In Uganda, the production of green gram is mainly done by small holder farmers in Northern and Eastern using local varieties with yields as low as 500kg/Ha (Ajio, 2016). This yield is low compared to potential yield of 3MT/Ha (Kilimo Trust, 2017). While currently increase in volume is obtained through expansion, there is need to promote high yielding varieties to meet the growing demand. In Uganda, Agriculture employs 70% of the population, and contributes half of Uganda's export earnings and a quarter of the country's gross domestic product (World Bank, 2018). In this context, the availability of market for green gram would spurs the agricultural exports and hence contribute in the government's efforts to promote the agricultural exports.

Literature Review

The theory of diffusion of innovation fathered by Everett M. Rogers (1995) seeks to explain how, why, and at what rate new ideas and technology such as new varieties spread. The theory explains, predicts, and accounts for the factors which influence adoption of an innovation. The author argues that individual's behaviors on adoption of innovations such as new high yielding varieties are determined by perceptions regarding relative advantage, compatibility, complexity and observability of an innovation. He stated that Diffusion is the process by which an innovation is communicated through certain channels over a period of time among the members of a social system. According to this theory, the stages by which a person adopts an innovation, and whereby diffusion is accomplished, include awareness of the need for an innovation, decision to adopt (or reject) the innovation, initial use of the innovation to test it, and continued use of the innovation. The

author defines innovativeness as the degree to which particular individual rapidly take up new ideas compared to others. He distinguished 5 categories: Innovators, early adopters, early majority, late majority and laggards. Hence, when promoting an innovation such as new high yielding green gram varieties to a target population such as individual small holder farmers of Soroti district, it is important to understand the characteristics of the target population that would help or hinder adoption of the innovation. Hence, this Theory suits this study on adoption of new green gram varieties in Soroti District.

Various researchers have tested and proved the IDT applicability in agricultural domains. For example, Simin and Janković (2014) confirmed that the theory of diffusion of innovations can be used in the research of organic farming systems, with the respect of all characteristics and particularities of organic farming. Geoffrey Kaine (2008) mentioned that it is important to apply the IDT for identifying and quantifying the population of potential adopters of an agricultural innovation by identifying the farm contexts for an innovation.

However, MacVaugh and Schiavone (2010) argue that this theory has some limitations. According to them, the IDT assumes that individuals adopt new technologies or innovations to maximize utilities. Literature has shown that in some cases adoption of innovation can be motivated by maximizing social orientation. Hence, the IDT is context dependent rather than generally predictive. The same authors mentioned that the theory does not take into account the different contexts and domains in which almost all new technology operates. This was corroborated by Peshin, Vasanthakumar and Kalra (2009) that mentioned the inadequacy of the IDT to manage the process of dissemination of Integrated Pest Management technology. In addition, the IDT underestimates the power of media. It assigns a very 3central role to different types of people critical to the diffusion process (Basorun, M. 2013). The author adds that the IDT does not consider another category of zero tolerance. These are individual who have characteristics of early adopters but still delay in adopting a technology due to various reasons such as social beliefs. Therefore, this study took into consideration all these gaps of the IDT to understand better the socioeconomic factor and adoption of new green gram varieties in Soroti district.

Geen gram (choroko) are not highly demanded by Ugandan consumers and as such are not widely grown in the country. It is only grown in Eastern and Northern of Uganda. However, due to growing demand from Kenya, South Sudan and Asian countries the crop is increasingly becoming a cash crop in Uganda (Mbeyagala, 2017). Despite, the growing demand of the crop, rich in proteins and minerals, its production is constrained by numerous challenges in Uganda such as insect pests and diseases, poor crop management practices, erratic rainfall patterns and low yield potential of currently grown local varieties/landraces (Mbeyagala, 2017).

In the efforts to respond to these challenges, various studies are being conducted. Ajio (2016) led a study to determine the optimum spacing within smallholder cropping systems and an optimum of 10X10 Cm was recommended for Uganda. Mbeyagala, 2017conducted a study on adaptation of introduced green gram genotypes. The results exhibited stability and high yield of the studied cultivars under Uganda conditions, and are therefore, recommended for release to farmers for cultivation. In 2017, the previous author under the Dryland Legume Research Program based at NaSARRI in partnership with NARO, led a study to assess and document farmers' preference for green gram using eleven introduced genotypes. The selected genotypes were early maturing (60-70 days), with large green or greenish yellow seeds addition, there has been developing new and better adaptable varieties as well as better crop management practices.

However, theoretically, the introduction of an innovation such as new green gram variety does not guaranty the adoption by farmers. Theory of innovation diffusion by Rogers (2003), that guided this paper, stipulates that farmers' behaviors, communication channels and access to various production assets are key for

innovation adoption. Various scholars have applied this this thinking to determine factor affecting agricultural innovation adoption. In addition, various authors (Aksoy, A., Külekçi, M., & Yavuz, F. (2011); Akullo, D. (20014); and others) have empirically demonstrated that there are indeed socio-economic factors that affect innovation in agricultural sector

Mitropoulos and Tatum (2000) have defined adoption as a process by which an individual or organization identifies and implements a new technology. On other hand, adoption refers as process which starts from awareness to continued use of the innovation. Gollwitzer (1999) mentioned that there is poor relationship between intention and behavior of adoption. To these effects, the study considered at least three seasons of growing new green gram and assurance of growing them in the coming season as continued use of the new varieties and measurement of adoption behavior.

Doss (2001), who conducted a study on farm-level technology adoption in Eastern Africa, came with distinction between discrete and continuous technology adopters among typical farmers who use either unimproved or improved inputs. The author defines a farmer as being an adopter if he or she is found to be using any improved materials. With respect to the adoption of improved varieties, discrete adoption refers to a farmer who stops using a local (traditional) variety and adopts an improved variety. In contrast, continuous adoption refers to situations where farmers increasingly planting more land to improved varieties, while continuing to grow some local varieties (Lopes, 2010).

Various authors argue that socio economic factors influence adoption of agricultural innovation such as new released varieties. According to Doss (2001) and men and women adopt agricultural technologies at different rates. Evidence from Ghana suggests that gender-linked differences in the adoption of modern maize varieties and chemical fertilizer result from gender-linked differences in access to complementary inputs.

Manyong, (2000) states that formal cultivar selection and crop programmes often focus on a few economically important traits such as yield or disease resistance but there are a number of potentially important traits related to culture and consumption preference that need to be considered for the acceptance of technologies. This corresponds well with Otim (1994) findings which indicated that farmers considered resistance and taste of the tuberous roots but they were not concerned with improved yields as it is often assumed. Farmers can accept varieties with apparent limitations such as low yields if what they perceive as the priority constraints have been overcome (Otim-Nape, 2007).

According to Wetterberg (2015), small holder farmers find risky to shift away from established agricultural systems such as traditional/saved seeds, traditional tillage, and reliance on family labor, animal manure for fertilizer, and long-subsidized inputs, to test new practices and inputs. The author adds that the reluctance issue is coupled with other constraints related to access to, use of, and awareness or availability of technological choices. He also mentioned that segmented social structures and cultural barriers (religion, ethnicity, and gender) can impede social learning and information sharing.

Yamada (2002), mentions that gender and education level highly influence adoption of new technologies. In his study conducted in Omon District Vietnam, he found out that Men usually use technologies for rice, fruit and fish production, and women use technology for pig, chicken production. Factors that trigger adoption of new technologies comprise of progressive, young and educated male farmers. Factors limited adoption of technology included conservative old men, and weak belief on ensure high yield of new technology. He also mentioned that farmers' changes of technology use are influenced by technical training, meeting, oral transmission, trust on technician and belief level on technology. (Yamada, 2002)

Education of the farmers and experience of the farmer were found to be the major influence of adoption of System of Rice Intensification in Mwea Irrigation Scheme Kenya (Ochienno, 2014). Similar findings were noted in Nigeria where Cocoa farmers in Ondo state adopt new innovation based on education level, experience and gender (Nmadu, 2015). Thereby efforts to develop new green gram varieties should be coupled with effective policies to enable their adoption. The paper will inform the policy makers and the private sector such as NGOs operating in the sector on cultural factors that they would face while disseminating the new green gram varieties in Soroti District.

The purpose of the study was to establish the relationship between cultural factors and the adoption of new green gram varieties in Soroti district. Specifically, the study sought to establish relationship between cultural factors and adoption of new green gram varieties in Soroti district. The null hypothesis Ho:, was that There is no relationship between cultural factors and adoption of new green gram varieties in Soroti districts.

Methodology

To explain the relationship between cultural factors and adoption of new green gram varieties in Soroti District, a cross sectional design with both qualitative and qualitative research methods was used. The study population was made by households involved in green gram production in Soroti. The study purposively targeted 7 sub counties based on the assumption that most of the agricultural activities are in rural areas. Hence, the study population to sample from was made by 32,401 HH from the 7 sub counties: Tubur, Kamuda, Asuret, Katine, Soroti, Arapai and Gweri

A mixed method approach was used study used both qualitative and quantitative approaches. Given the objective of the study, the quantitative data from the households was the most focused on and it was substantiated by qualitative data from key informants. Both individual and key informants interviews were conducted using respectively a structured questionnaire and key informant interview guide. A total of 257 respondents were involved in the study. To ensure data quality reliability and validity tests were conducted. The Content Validity Index was greater than the minimum of 0.42 as stated by Lawshe (1975). A content validity index (CVI) was also calculated for the whole questionnaire. The reliability was calculated based on the Cronbach Alpha coefficient (CAC), all the variable items were found to be reliable. Their values were greater than 0.7 the threshold (Nunnally, 1978 and Aupal, 2017)

The stratified sampling was done following the sub counties. 7 sub counties were purposively. Based on calculations made using the Yamane (1967) formula, the sample was made by 395 households. This sample was distributed using proportions and each subcounty, the households to be part of the study were randomly selected. An updated list of households from the local government office was used to randomly select respondents using random tables. Completed questionnaires were reviewed to ensure accuracy, consistency and completeness of information before leaving the field. Data from the questionnaires was arranged, coded, edited for consistency and easiness and later entered using Statistical Package for Social Scientists (SPSS v.20).
The qualitative data from individual households and key informants was transcribed into NVIVO.11

Results and Discussions

Amin (2005), asserts that higher response rates are considered to yield more accurate survey results. Johnson (2003) noted that that there was no formal policies regarding minimally acceptable response rates however, some study respondent mentioned that 60% would be the threshold for a study to be accepted in a journal. This study had a sample of 395 distributed in 7 sub counties with the total of 395 households, the researchers were able to interview 257 (65% of the expected respondents). For key informants interviews targeting District officials, Church leaders, Agricultural extension officers and Cooperatives/market chairmen, 10

respondents were interviewed. The researchers had already reached the circulation point in responses recorded. According to Fernandez (2016), demography is concerned with human populations: size, distribution, composition, components of population change, and determinants and consequences of population change. A total of 257 heads of households participated to this study.

From the demographic results in Table 1, among the interviewed respondents, Male were 65% while 35% were females. This results show the fact that in Uganda, households are headed by mainly males compared to females. The UBOS (2017) during the national household survey revealed that 31 percent of households in Uganda were female headed. Hence the study findings corroborate the UBOS findings.

The respondents were within the age brackets of 41 yeas & above, and 36-40 with respectively 33%, and 28% of the respondents. Hence, 61% of our respondents were adults beyond 35 years. This is explained by the nature of our population that considered households heads as respondents. The results of this study were in alignment of the results of national bureau of statistics that reported in 2017, that 63% of the HH were headed by people aged beyond 35 years.

Similarly, 55% of interviewed heads of households had not received their primary certificates. Either they did not attend at all or they did not complete the primary education. 40% holds primary school certificate while only 4 have diploma and 1 a degree. These results are explained by the fact that Soroti District is located in the rural area settings where 68% of the population are illiterate (UBOS, 2017).

The results also showed that, 80% of the respondents are only occupied by farming and hence earning leaving from agriculture while 14% combine agriculture with business such as trade and only 6% were earning leaving from salary in addition to agriculture. Furthermore, 68% of the respondents have been involved in green gram farming for more than 5 years. Qualitative data from subcounty representatives mentioned that green gram has been a major crop for the households for years. According to them the number of years in green gram farming is determined by the age from which the household was set (e.g. from the marriage).

Descriptive statistics for the Study Variables

Cultural factors considered were religion, main food consumed, perceived cash crop, perceived demanded crop, and perceived crop grown overtime. The results from the item mean analysis of cultural factors reveal that religion does not interfere with neither adoption of new green gram varieties nor use of farming practices, use of fertilizers and pesticides. For all the religion related items the rates vary from 3 to 5. Meaning there is no one from our respondents that reported disagreeing with the statements related to religion.

The respondents pointed out that green gram is perceived to be the most demanded and grown crop with respectively mean of 4.60 and 4.61. This was corroborated by qualitative data from key informants especially market and association chairmen. These mentioned that green gram is the most demanded and grown compared to other pulses (e.g beans, soybeans and peas). They went ahead and stated that local green gram varieties are the most preferred and hence demanded in the local markets compared the new green gram varieties.

With the averages of 4.01 and 4.05 respondents reported that green gram is the most consumed and the main source of finance compared to other crops. However, the standard deviations of respectively 0.984 and 1.103 reveal that there is high variability in the data spread around the mean, hence it is not clear at what extend participants have agreed with the two facts. To clarify, an additional analysis of frequencies was made and

revealed that 48% SA, 19% A, 20%N, 9% D and 4% SD with the statement on source of finance, while 67% SA and 25% A on the statement of the demanded crop (Table 2).

The results on source of finance revealed that 33% of the interviewed do not agree with the fact that green gram is the main source of finance from crops. This was also confirmed by qualitative data from key informants that mentioned that there are other food commodities and livestock products from which farmers source their income. Especially in Asuret Sub County, key informants mentioned that Fish and Fish farming is the most prominent source of income due to the lac Kyoga in the vicinity. Other key informants stated that tourism and mining industries are prominent sources of income for households in Soroti District.

These findings are in alignment of Ministry of Trade, Industry and Cooperatives publications about Soroti District Economic profile that mention agriculture (crop and livestock) tourism, mining and fish industries as the main sources of income for Soroti households. The same source mention other crops grown in the district such as citrus, sweet potatoes, Sorghum, cassava, sesame, ground nuts, finger millet, cowpeas, rice, cotton and beans. This is in addition to livestock kept by households: cattle, goats, sheep, rabbits, piggery and poultry.

Adoption of new green gram varieties

In order to examine the level of agreement and/or disagreement on the different items used to measure dimensions of adoption of new green gram varieties in the questionnaire, item mean analysis was carried out. The questions' responses were anchored on the five-point Likert scale ranging from strongly disagree, disagree, neutral, agree and strongly agree.

Furthermore, adoption of new green gram varieties was measured in terms of consistency in planting new green gram varieties. 4 seasons were considered with one among them being the coming season.
The agreement or disagreement to whether new or local green gram varieties are planted for a particular season is widely spread around the mean of around 3 with a standard deviation of 2. This means that the participants either strongly agree or strongly disagree

The respondents agreed that local green gram varieties are available. The mean analysis shows results of 4.4 and a small standard deviation of 0.6. In addition the analysis of frequencies in terms of percentages prove that 99% agreed with the availability of local green gram seeds. This was corroborated by qualitative data from key informants that mentioned that local varieties are the most popular in shops and that farmers keep their own seeds to use in the following seasons because seeds become expensive at planting period.

Interviewed household heads disagreed that new green gram varieties seeds are expansive. Indeed, they stressed that at planting period, local green gram seeds are the most expensive compared to the new green gram varieties seed. The researcher sought to ask specifically key informants the reason to why farmers still chose to buy local and expensive varieties compared to so called improved, high yielding and cheap varieties. Key informants responded that the most determining factor for choosing to grow local or improved varieties is market availability. They went ahead and clarified that farmers plant new green gram varieties because they have been commissioned by buyers such us multipliers (NaSSARI) or exporters such as Katine Joint Farmers Cooperative Society (KAJOFACO). Otherwise, farmers prefer local green gram varieties because their fetch high selling prices and are the most demanded by local buyers.

While analyzing data, it was realized that respondents were classified in 4 groups according to the way they are dealing or not with new green gram varieties and it has been described in the chapter 3. Among the 257 household heads interviewed, only 20.6% and hence 53 households had consistently been growing new green

gram varieties by the time this study was conducted. This substantiates the presence of the issue of adoption of new green gram varieties in Soroti District and that the introduction of an innovation does not guaranty the adoption by farmers (Rogers, 1999). As mentioned earlier, qualitative data from key informants revealed that the adopters are commissioned to grow new green gram varieties. They added that commissioners target associations, groups or cooperative for ease communication and bulking at harvest. A close analysis of this category of adopters, using cross tabulations, revealed that, indeed, these are members of organizations. Among the 53 households consistently growing new varieties, 41 and hence 77% are members of organizations (See details in annex 7). In addition, the same kind of analysis revealed that the adopters are the most sensitized to grow new green gram varieties compared to others. 48 and hence 91% of the adopters had been sensitized to grow new green gram varieties. These findings are in agreements with Adong (2012) and Langat, B.K. (2013). The former stated that farmer groups are important avenues through important agricultural information like new technologies are disseminated; and the latter found out that there are several determinants for adoption of an innovation among small holder famers of which extension services is among those which had significant influence.

The researcher was curious to know the distribution of the respondents especially the adopters according to demographics. While Rogers (1999) clarifies that majority of early adopters are expected to be younger, and more educated, the results of this study revealed that adopters were adults (73%) of more than 35 years. On the other hand the study results are in agreement with Melesse (2018) on gender aspect of the adopters. He stated that men have freedom of mobility to attend trainings and meetings and hence, households headed by men have high probability of adoption of new innovations. Indeed 74% of the adopters in this study were males. Ochienno (2014) mentionned that experience in farming and education of farmers are key determinants of adoption in agricultural sector. While the study results on experience in farming revealed the same: 79% had been growing green gram for more than 5 years; education of the study respondents did not show the same results. 47% of the household head that adopted new green gram varieties did not have any level of education while 43% had only a primary school certificate

In addition to the category of adopters, it was also found that there is a category of households that consistently grow new green gram varieties while keeping growing also the local varieties. This study baptized them continuous adopters in agreement with Doss (2001), who came up with distinction between discrete and continuous adopters. The former refers to those who solely grow new green gram varieties while the latter refers to those consistently growing both and local varieties. These were 22% of the total study respondents. 72% of them are members of associations and 78% of them have access to sensitization.

Another category of adopters observed was that of farmers who inconsistently switch the local and new varieties between the seasons. These were 15% of the study respondents. When asked why of the inconsistency, they mentioned that it is all about markets. For the seasons they are not commissioned to grow new green gram varieties they switch to local varieties.

At the extreme end there were interviewed farmers who did not at all grow new green gram varieties for the last three seasons and they don't even plan to grow the new green gram varieties in the coming seasons. This category of farmers were baptized non-adopters. They were 42% of the respondents. 77% of them are not members of any association and 95% of them have never been sensitized to grow new green gram. However, they are aware of the existence of the new green gram varieties and they believe that the new varieties seeds are not expensive. When asked why they don't grow new varieties, they mentioned that they are satisfied with local ones since these are the most demanded in the local markets at a high selling price per Kg.

Inferential Statistics

To understand the relationship between the study variables: Socioeconomic factors and adoption of new green gram varieties, the Pearson's correlation test was performed. This test provided coefficients that allow to numerically interpret the relationship between the two variables. The interpretation was made based on the results summarized in Table 3.

The results reveal that the Pearson coefficient of correlation for the cultural factors and adoption of new green gram varieties is -0.131 and the correlation is significant at 0.05. Hence, we conclude that there is a significant negative correlation between cultural factor and adoption of new green gram varieties. In other terms, the more the cultural factors are important, the less farmers adopt new green gram varieties in Soroti district.

To predict the adoption behavior of Green Gram farmers in Soroti district, a regression model was used (Table 4). The results revealed that cultural factors explain 1.7% of the adoption behavior. The low R square means that there are other factors that explain the adoption of new green gram varieties in Soroti district. Indeed, interviewed key informants and farmers growing the new green gram varieties stated that market is the major determinant of adoption of new green gram varieties. In addition credit facilities and farming systems were also revealed as other factors determining adoption of new Green Gram Varieties in Soroti District. The regression model was significant and hence reliable to make valid conclusions and recommendations. Both the constant (α=4.2; $p<0.001$) and the coefficient for cultural factors (β=-0.447, $p<0.05$) were significant. The negative value of the β coefficients implies that the more cultural factors are important the less adoption of new green gram varieties.

Conclusion and Recommendations

The study sought to establish relationship between cultural factors and adoption of new green gram varieties in Soroti district. Data was collected by conducting face to face interviews with household heads and key informants: district officials, market chairmen, Cooperative chairmen, local government officials, and church leaders. Data from respondents was coded and analyzed using SPSS and descriptive and inferential statistics results were generated. Most respondents were beyond 35 years, with no formal education. Most of them had agriculture as occupation and have been farming for more than 5 years.

The correlation findings revealed that there was a significant negative correlation between cultural factors and adoption behavior of farmers in Soroti. The more farmers stick to their cultural beliefs, the less they adopt new green gram varieties.

This was corroborated by the regression analysis that exposed the negative and significant coefficient β for the cultural factors. This implies that the more cultural factors are important the less adoption of new green gram varieties.

Results from item mean revealed that while religion was not a hindrance from adopting new green gram varieties, it was neither a spurring factor since some respondents were neutral about the statements. In addition, respondents stick to the fact that green gram is culturally grown overtime, that it is the most demanded and consumed food commodity while they still consider green gram as main source of finance. The findings are in line with Rogers (1999) that clarified that late adopters are expected to be conservative and not willing to take risks.

Farmers in Soroti district believe in the local green gram to be more nutritious and sweet compared to the new green gram varieties. In addition growing green gram is more of a tradition than a business. Thereby, these cultural beliefs hinder the adoption of new green gram varieties. This is aggravated by the consumers' perceptions of new green gram varieties that lead them in preferring local varieties. Thereby, in the process of sensitization on new green gram varieties adoption, the consumer side should also take into account.

These factors will need to be dealt with in order to increase adoption of new green gram varieties. Community leaders such religious and political leader should be involved in the programs aiming at increasing adoption of new varieties in order to consistently sensitize farmers so they can change their perceptions on local and new green gram varieties.

In the light of the research findings mentioned in the previous sections, research institutions promoting the new green gram varieties should liaise with local government officials and churches leaders to sensitize more about the new varieties. Evidence based of the benefits of the new varieties should be explained to farmers through demo plots or export market information.

The findings on cultural factor and adoption on new green gram varieties provided information on how cultural belief and behaviors hinder the adoption of new green gram varieties. This paper constitutes an eye opener for promoter of the new varieties. It provides evidence-based proof that the are cultural barriers to deal with through intensive sensitization sessions in collaboration with church leaders and local government.

Table 1: Demographic characteristics

Demographic characteristics	Observation	Frequency	Percentage
Gender	Male	167	35
	Female	90	65
Age	18-24 Years	18	7
	25-30 Years	28	11
	31 to 35 Years	54	21
	36 to 40 Years	72	28
	41 Years and above	85	33
Education level	None	141	55
	Certificate	103	40
	Diploma	10	4
	Degree	3	1
Occupation	Only Agriculture	206	80
	Agriculture and Business	36	14
	Agriculture and salaried employment	15	6
Experience in growing green gram	Less than a Year	5	2
	Between 1 to 3 Years	26	10
	Between 3 to 5 Years	51	20
	Between 5 to 10 Years	82	32
	More than 10 Years	93	36

Source: Primary Data (2018)

Table 2: Percentage of Respondents per Item and Anchor for the Cultural Factors

Items	N	SD	D	N	A	SA
My religion allows the adoption of new green gram varieties	257	0.00%	0.00%	3.95%	45.45%	50.59%
My religion allows modern farming practices	257	0.00%	0.00%	3.56%	34.78%	61.66%
My religion allows the use of fertilizers	257	0.00%	0.00%	1.98%	37.15%	60.87%
My religion allows the use of pesticides in the crops	257	0.00%	0.00%	1.58%	32.81%	65.61%
GG is the main food in this household	257	0.79%	5.16%	28.17%	25.00%	40.87%
GG is the main source of finance in this household	257	1.59%	9.56%	20.32%	19.52%	49.00%
GG is the most demanded crop in the market	257	0.00%	1.20%	5.60%	26.00%	67.20%
GG has been grown overtime in this area	257	0.00%	0.00%	4.42%	29.32%	66.27%

Source: Primary Data (2019)

Table 3: Correlation Analysis

Variables	Mean	SD	Cultural Factors	Adoption
Cultural Factors	4.44	0.355	1	
Adoption	2.22	1.197	-.131*	1

*. Correlation is significant at the 0.05 level (2-tailed).
N = 257

Source: Primary Data (2019)

Table 4: Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.212	.953		4.421	.000
	Cultural Factors	-.447	.214	-.131	-2.091	.038
R		.131[a]				
R Square		.017				
Adjusted R Square		.013				
F		4.371				
Sig.		.038[b]				

a. Dependent Variable: adoption2

b. Predictors: (Constant), CULTURAL2

Source: Primary Data (2019)

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