

**PROMOTING CLIMATE RESILIENCE IN AGRICULTURE THROUGH SMALL
TRADITIONAL GRAINS VALUE CHAINS**



A sorghum farmer tilling her farm

Picture Courtesy of Christian Aid

(Winnifred Ndinda Mailu)

Christian Aid,

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List of abbreviations

ASAL	Arid and Semi-arid land
SIDA	Swedish International Development Agency
CA	Christian Aid
CIS	Climate Information System
COP21	Conference of Parties 21st yearly session held in Paris
CSO	Civil Society Organisations
DRR	Disaster Risk Reduction
FAO	Food and Agriculture Organisation
Kes	Kenya Shillings
Kg	Kilogram
M&E	monitoring and evaluation
MT	Metric Ton
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
SALI	Sustainable Agricultural Livelihoods Innovations
SMS	Short Messaging Service

Preface

Climate change poses a major challenge to agriculture development in Africa. The ever increasing unpredictability and erratic nature of weather systems on the continent is straining food security and rural livelihoods systems (IPCC WG 2014). Agriculture is expected to pay a significant cost of the damage caused by climate change. However, it is also the key economy driver on the continent and the main channel offering ecological interventions room to mitigate climate change. Kenya has a land area of 580,728 km², out of which approximately 85% is classified as arid and semi-arid land (ASAL). According to the 2009 census, the country had a total population of 39 million people (2009 Census Report), with 67.7% of the population living in rural areas and 32.3% in urban centres. The ASAL areas support almost 30% of the total national population and 70 % of the livestock production.

Kenya has in recent years had its share of climate-related impacts including: prolonged droughts; frost in some of the productive agricultural areas; hailstorms; extreme flooding; receding lake levels, which are made worse by the invasion of weeds e.g. Lake Victoria; and the drying of rivers and other wetlands. Among others, these impacts are leading to large economic losses and are adversely impacting food security. Many of these extreme climate events have led to displacement of communities and migration of pastoralists into and out of the country, resulting in conflicts over natural resources. Slow-onset events associated with climate change can also lead to competition over scarce resources resulting in human-wildlife conflicts. Other climate change impacts include widespread disease epidemics, sea-level rise, and the depletion of glaciers on Mount Kenya. The country's economy is highly dependent on climate sensitive sectors including agriculture, tourism, and energy. Agriculture is the backbone of the Kenyan economy directly contributing 24% of the GDP valued at KSh342 billion in 2009 and another 27% indirectly through manufacturing and distribution, valued at Ksh.385 billion. However, the full potential is yet to be tapped and is envisaged to come from transformed agricultural value chains.

The National Climate Change Response Strategy (2010) was the first national policy document to fully acknowledge the reality of climate change in Kenya. The NCCRS has been guiding policy decisions since its launch in 2010. The Strategy provided evidence of climate impacts on different economic sectors and proposed adaptation and mitigation strategies. It is this strategy and Kenya's National Climate Change Action Plan 2013-2017 (NCCAP) that inspired the birth of a climate smart agriculture idea named SALI (Sustainable Agricultural Livelihoods Innovations), which has been practised in Mbeere District since 2011 by Christian Aid Kenya. The NCCAP and Christian Aid Kenya (CA Kenya) partner in climate smart agriculture through: adapting climate information to fit agriculture practise; enhancing food security and human health through hybrid drought resilient crops utilised in the ASALs; encouraging DRR and climate change adaptation outcomes that build resilience and diversify income sources; supporting institutions to provide adequate policy frameworks to equip poor producers and invest in pro poor social and other supportive mechanisms; supporting CSO engagement for improved agricultural productivity and health outcomes.

Abstract

This report seeks to present findings of a snap check on the impact of the Sustainable Agricultural Livelihoods Innovations (SALI) programme in Mbeere, Embu County. It is based on only a small sample collected from smallholder farmers due to time constraints. More data was also collected through different methodologies: interviewing, key informants, and focus group discussions. Data samples were evenly distributed in the project area but this was not done in any scientific way. Rather the samples represented the 3 project zones of SALI.

The objective of the report is to show that Christian Aid is promoting drought resistant crops in arid areas of Kenya to support communities adapt to climate change. Christian Aid is working on this in partnership with the government and other stakeholders. The main reasons for this are:

- The grains are drought resistant and therefore key to food security in the arid and semi-arid lands that cover two-thirds of Kenya. In the face of climate change, they are seen as increasingly important in enhancing the resilience of food systems.
- The grains are currently grown by poor farmers who live in marginal areas, so increasing their marketability may help with poverty eradication.
- Yields of these grains are currently low, with significant room to increase them
- Sorghum, millet and green grams are nutritious food crops rich in proteins, carbohydrates and other essential minerals. They are also affordable compared to other foods.

The sample size was a very small fraction of the total number of farmers, notably 54 sorghum farmers, 46 millet farmers and 77 green grams farmers. The assumption is that the sample size will not affect the outcome of this study.

The results indicated that all farmers were receiving the climate information services informing them on how to go about managing farming of small grains and other crops but farmers recommended they would like to improve the current SMS based system to one that is more interactive.

Productivity was at about 50% of expected capacity but with better extension and improved seed, farmers would improve this further. Farmer revenues were quite high and compared well with other crops such as maize. This indicated that small grains could be important for both increasing food security and as a commercial crop for the farmers. The farmers could improve the productivity of these crops by gaining knowledge through model farms and extension services.

Overall, this report shows that farmers could benefit by increasing the areas of land dedicated to growing small grains as opposed to concentrating on maize, as this would help them better cope with current and expected future weather changes. The small grains have proven to be drought resistant compared to Maize, which is currently the most popular staple crop grown by farmers in Kenya

1. Introduction and objectives of the study

In Mbeere Embu County, where we propose to build on the lessons and successes realised for the last three years, climate change continues to affect people's livelihoods.

The area has not received adequate rainfall in the last four seasons, leading to poor harvests, dead livestock and an increasingly fragile environment. The long rain seems to have become increasingly unreliable as the rainfall declines and is more variable and erratic. Rain fall patterns are important for food supply in Kenya, since the majority of agriculture is rain fed. The destruction of vegetation due to overuse of pasture and non-sustainable charcoal burning practices (domestic firewood use amongst other practices) also continue to have a negative impact on the ecosystem. The community has experienced significant levels of malnutrition and food aid is being provided to communities in the area by the government and donors, both local and international.

It is against this backdrop that Christian Aid – Kenya, since April 2011 has worked with over 2,000 poor and marginalised farming households to sustainably enhance the livelihood options and outcomes of the project beneficiaries.

Why Small grains:

The Mbeere region is well known for its potential for producing cereal crops, including sorghum, but this potential has not yet been exploited to its optimum. Sorghum is one of the most drought tolerant crops locally available and has been grown in Mbeere for decades at a subsistence level, but with minimal attention from the Ministry of Agriculture and with poor returns. It remains very well adapted to the climatic conditions of Mbeere, and more so in the ever changing, unpredictable and erratic rainfall that the area continues to experience, particularly in comparison to other cereal crops.

The Kenyan government has a strategy to promote such crops as it moves towards addressing food insecurity in the country, especially in areas heavily impacted by climate and weather related challenges. Christian Aid in partnership with other stakeholders including the government seek to support poor communities living in ASAL areas, the crop provides an opportunity to increase community resilience if there is a concerted effort to promote it. Sorghum, millet and green grams are nutritious food crops rich in proteins, carbohydrates and other essential minerals.

2. Issues to be addressed

Food Security:

This project continues to sensitise farmers on the importance of sorghum as an alternative to maize production, and more so as an alternative food crop. The focus on this aspect is to strengthen production systems as well as enhancing productivity to generate surplus crops for marketing. The Kenya population relies heavily on maize for food yet this crop is one of the most affected by current weather changes. It has been recorded that maize production is declining over time. Maize has always been Kenya's staple food and there are fears that the

country might face starvation due to shortage of this grain. This is not news to Kenyans nowadays because there has been consecutive drought seasons for the last five years. Today we are told that Kenya risks starvation unless it imports maize. However, maize is not the only answer to food security in Kenya.

Access to Markets:

The Christian Aid Inclusive markets programme is implementing market based solutions¹ in poor rural populations in dry lands. This implies that communities are not only trained in good agricultural practises, but they are also linked to markets for their surplus.

The programme will focus on strengthening community marketing structures and develop their capacity to enhance their bargaining power with the various actors in the value chain. Farmers are trained on collective marketing, business planning, and entrepreneurship through their groups; they are also supported in getting fair contracts from the companies with which they trade.

The main reason for supporting farmers' access to markets is because markets offer incentives to grow more grains for income generation for the families. Beyond food security the rural families need disposable incomes for other basic needs like shelter, education, clothing, etc.

Access and use of climate information by use of SMS:

Christian Aid and its implementing partners have a strong working relationship with the Kenya Meteorological Services through which communities have benefited from downscaled climate and weather information to community level. The desire through this project is to develop a more comprehensive plan for Climate Information Services as well as implement a more comprehensive communication framework for farmers. This will ensure there is a more targeted and more effective communication framework suitable for farmers and tailored towards specific crops production such as sorghum.

The SMS based climate information services is set up in a way that the Meteorological department is able to send updates on weather information to a central server. The project has a contract with a mobile service provider to disseminate bulk SMS services to many farmers at once. Information received is interpreted into a text and sent to farmers.

Access to finance;

In order to develop a successful value chain with regards to sorghum, appropriate and affordable financial products for the various chain actors, especially farmers, are necessary. The project will also focus on engaging various financial service providers towards enhancing access to finance for development of the sorghum value chain. Christian Aid and its partners would also consider smart subsidies and weather based insurance packages that are appropriate for the value chain while also exploring self-financing mechanisms among farmer producer groups and associations.

Access to extension services and inputs;

¹ www.makingmarketsinclusive.com

For farmers to be able to improve production, they need support to access affordable inputs and training. The training is focused on best agronomic practises such as the right seed to use, time of planting, weeding and harvesting, post-harvest management, record keeping at farm level etc. Farm inputs and technologies are often very expensive. Farmers will be informed on what technologies are available and will also be supported to access inputs like improved seed. Another important lesson for farmers is training on composting so that they can cut down significantly the high cost of production. Composting supplements the use of expensive fertilisers by small holder farmers.

3. The climate change perspective

i) Historical climate and past climate changes;

20 years ago, the weather pattern for Mbeere was favourable, in that farmers could plant maize and harvest good yields for food and sale. Over time weather patterns have deteriorated and have resulted in famine since maize is not drought resistant. Resulting crop failures undermined Mbeere's food security and drove farmers to poverty, largely due to a lack of knowledge on how to adapt to climate change. Farmers could supplement their incomes with livestock. However, over time, weather change has also resulted in the drying of seasonal rivers where locals could fetch water for domestic use and livestock. As a result, prolonged drought spells have resulted in several livestock deaths, making it risky for farmers to keep many animals. The Mbeere region is now classified as a semi-arid region.

ii) Indications of on-going climate change;

Table 1:FAO (2010). Land degradation assessment

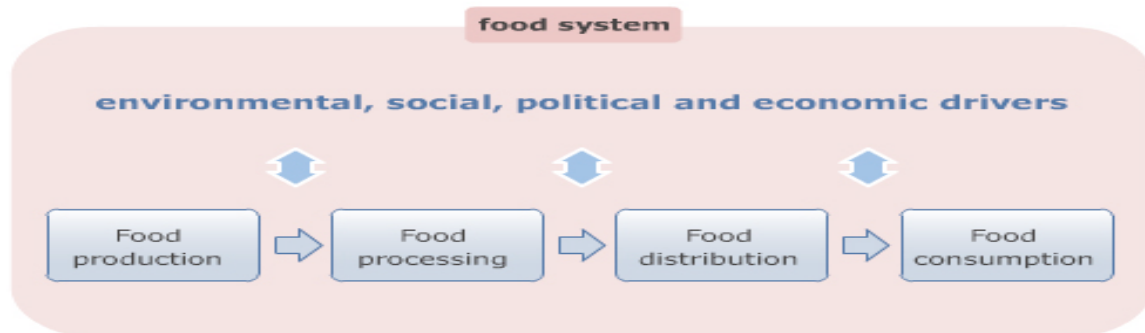
Indications	Relevance for Mbeere
Inadequate, variable and erratic rainfall	The rainfall over time in Mbeere has been declining and is erratic. The implication is that there is a need to start planning around these new cycles
Drying rivers	Drying rivers result in reduced water resources both for humans and livestock
Prolonged drought spells (long time with little or no rainfall)	As above
Waning vegetative cover, with the drought resistant types remaining	Vegetation is important as food for livestock, lack of it results in famine for livestock and humans
Poor agricultural productivity for non-drought resistant crops	Mbeere namely grows maize, there is a danger that lack of uptake of drought resistant crops will result in food insecurity
New, unknown diseases affecting humans, crops and livestock	As above; Mbeere can benefit on crop diversification to spread the risk of poor crop performance due to droughts and disease
Big shifts in the ecosystem	Mbeere is now categorised as semi-arid land and therefore there is need to start developing contingent plans to deal with new climatic changes
Rural-urban migration in search of jobs after losing hope on	Young and able adults can no longer depend on agriculture; they tend to move to urban areas for employment and general

agriculture	survival
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iii) *Vulnerability of climate change in the sectors covered by the report;*

Livelihoods in the Mbeere region are heavily climate dependent as having agriculture and livestock keeping are the main economic activities. Vulnerability of the region to climate change can best be illustrated by highlighting each component of Mbeere's food system that contributes to overall food insecurity.

Table 2: Adopted from African Centre for Economic Transformation (2015)



The table provided is adopted from a study done by African Centre for Economic Transformation (ACET), to show how different sectors and actors in the value chain are affected by climate change. These are presented below alongside factors that are contributing towards food insecurity in Mbeere:

Food Production: primarily vulnerability to food insecurity when food production declines due to:-

- Decreasing yields due to erratic and inadequate rainfall,
- Declining employment from agricultural production (hence rural urban migration),
- Dying livestock,
- Waning productive land,
- Drying rivers,
- Little or no support from the local government,
- Poor seed replication
- Little knowledge on the best agro-inputs.

Food processing and distribution:

- With low yields, less labour is required to clean, dry, thresh, winnow and store grains.
- Poor roads,
- Poor market infrastructure,
- Failure to afford transport to market (hence value lost to middlemen who take advantage by dictating prices, forcing farmers to be price acceptors).

Food Consumption:

- Inadequate food,
- Reliance on expensive processed food.

iv) Awareness of climate change and its consequences on the covered sectors;

The majority of farmers in Mbeere can only describe their experiences of changes in weather pattern. They rely on traditional knowledge of seasonal patterns which are ever changing. The direct consequence is that they have not adopted any coping mechanisms and are not planning to due to their lack of understanding about climate change and how it will affect them. Of course they notice the changes in weather and declining agricultural productivity, but without knowledge on the cause, and of adaptive and mitigating options, they are in no position to do anything about it. As such their investments in farming both in crops and livestock will continue to fail them, driving them towards levels of abject poverty. Those who lose hope in farming potentially engage in activities that are environment damaging, unsustainable, socially unacceptable or shift balance socially. Examples are charcoal burning, pastoralism leading to overuse of pasture, rural-urban migration, and to some extent crime and drug trafficking. Massive awareness needs to be created on which future interventions could focus on.

v) Trans boundary aspects

The region relies heavily on services from the neighbouring regions; however, due to effect of climate change, the cost of accessing these services is very high. For instance the goods produced have to be transported to markets outside the county, resulting in high logistical costs. This perpetrates poverty as the rural farmers end up getting very minimal margins.

4. Methodology

4.1 Method 1: The survey

A survey was undertaken to collect data on important parameters that were measured to provide a reference point for project performance. The key information collected was on: number of farmers, crops grown, willingness to diversify to sorghum and other drought resistant crops, yields, access to inputs and markets and most importantly access to timely climate information services, among other data parameters.

The sub activities were carried out in this manner:

- *Pre-test the survey tools: A sample of 20 farmers was selected to pre-test the tools. Thereafter a few amendments were done and the tools were finalised.*
- *Data collection: Data collection was done for 130 farmers.*
- *Analysis and baseline report: Reports were analysed using excel while the rest was qualitative information. As part of the baseline; economic livelihood mapping was done.*

4.2 Method 2: Evidence-based scale up of drought resistance crops

Christian Aid aims to use this information to scale up work on drought resistant crops. The current project supports about 2,000 farmers but is projected that up to 20,000 smallholder farmers can learn and benefit from these lessons. 10 demonstration pilot plots were set up to provide evidence based controlled environment of how well the crop can perform within the region if all factors are well considered by the farmers. Other farmers were invited to participate in these demonstration plots for learning.

Climate Change -Mitigation and Adaptation

As part of promoting access to markets for selling the surplus produce, the project was supporting the farmers to reduce post-harvest losses by adopting good storage facilities for the grains. Good storage is important for both food security and keeping surplus for sale.

4.3 Method 3: Design and disseminate climate information services (CIS)

In this activity, a partnership was hatched with the Kenya Meteorological department to enable the project to get both climate and weather information that was shared with farmers at an agreed frequency. The information was designed in a manner in which farmers could provide feedback to gauge the level of usefulness.

Climate information downscaling was done using locally available means of communication such as radios, mobile phones, open village meetings among other possible ways of community information dissemination. The main factors in consideration were access, efficiency in delivering information and frequency.

5. Survey Findings

5.1 Baseline Results

A baseline study was carried out and is summarised under key headings:

a) Size of Land

Sorghum is largely produced by smallholder farmers. The survey indicated that the majority of sorghum farmers owned between 4- 6 acres of farm land, though a few had six acres or more. Most of the respondents own land based on ancestral inheritance, and a significant number of farmers have title deeds.

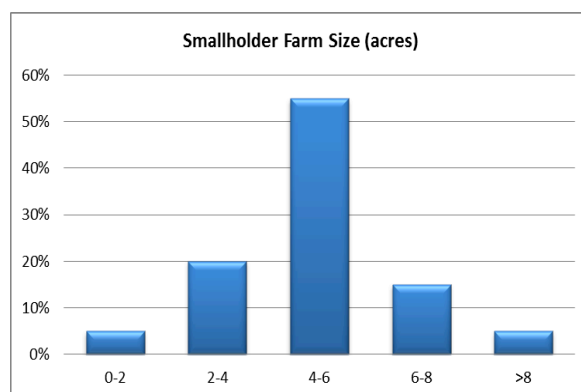


Figure 1: Size of farm for Smallholder farmer

b) Land under crop

Most of the farmers practice mixed cropping and intercropping; the main other crop grown was Maize; this used under 45% of the total land share, which in all circumstances took a larger share of the cultivated land compared to other crops (Figure 1).

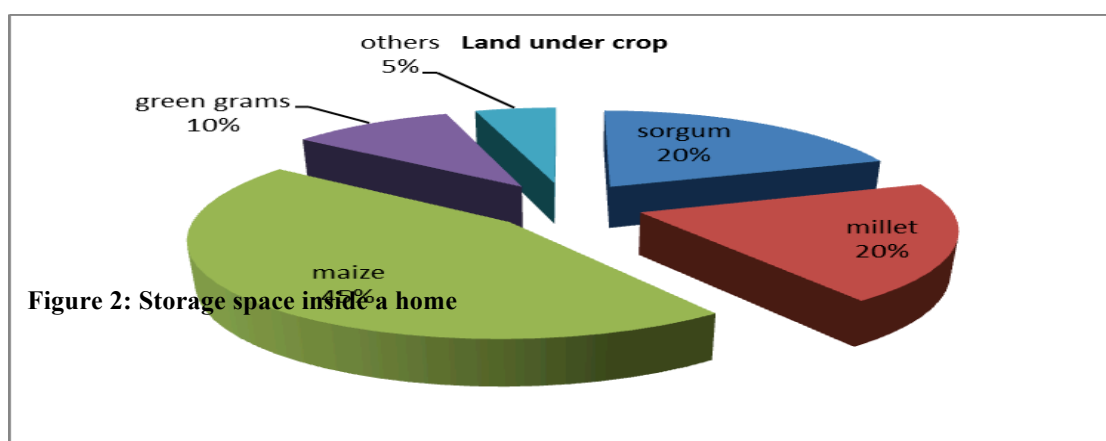


Figure 2: Storage space inside a home

c) Production

The survey found that sorghum, millet and green grams are producing between 100 to 300 Kg on average per acre, against an expected capacity of between 700-800kg/acre. Of all farmers surveyed only 1 could produce over 1MT (metric ton; 1000 kg) of sorghum per one acre and no farmers were achieving over 1MT/acre of millet and green-grams. Most farmers preferred production of green grams compared to sorghum and millet. This was because the productivity per acre of green grams is higher than that of sorghum and millet (Figure 2).

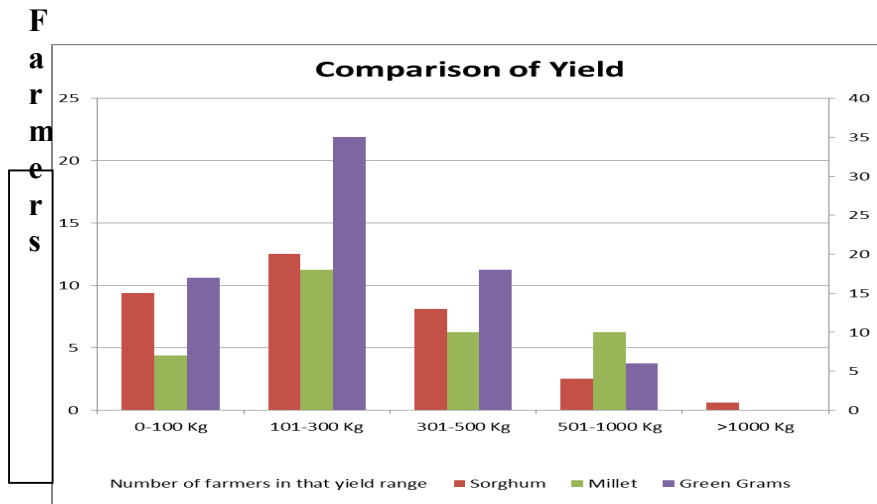


Figure 3: Comparing Yield of 3 value chains

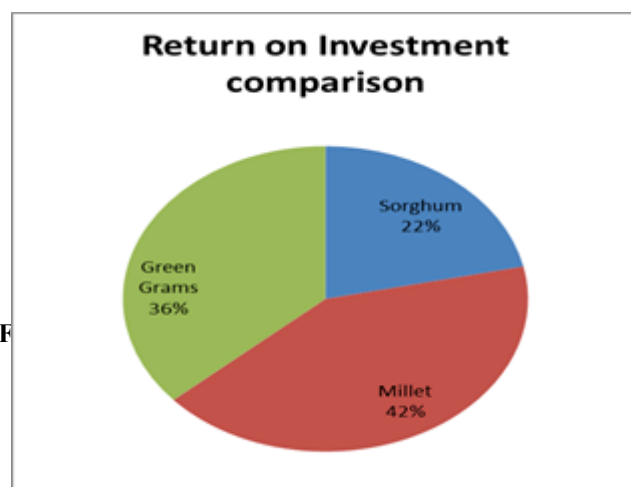
d) Gross margin analysis

In order to compare profitability of the 3 crops to the farmer, the Gross Margin was used; this compares revenue from the farm crop and cost of all factors of production. The reason for using this Gross margin is to help figure out how much of the revenue generated by one acre of small grains is used to cover the costs of production and is therefore resulting in profits. The higher the gross margin, the more efficiently a farmer is operating.

$$\text{Gross Margin} = (\text{Revenue} - \text{Costs}) / \text{Revenue}$$

The gross margins for drought resistant crops were high; in this case sorghum, green grams and millet all had positive gross margins.

This indicates that they are profitable crops. This result shows that despite poor weather conditions, drought resistant crops always realise good returns. The return on investment was as shown below. These results show a lot of potential if better conditions prevail.



e) Marketing Groups

The study compared how much profit a farm would make from selling as an individual Vis a Vis bulking with other farmers. The gross margin was higher at 2.09 when the farmers sell their produced as a group as opposed to selling individually where they would earn a margin of 1.15. The reason is that unit price of sorghum was better at 27/- per Kg as opposed to 20/- since the association had bulk and higher bargaining power.

Table 3: Comparing individual Vs group marketing Margins

	Selling as Individual Farmer			Selling through Market Association		
	Quantity (kg or units)	Unit Price Ksh	Total Value Ksh	Quantity (kg or units)	Unit Price Ksh	Total Value Ksh
SALES						
Total Marketable yields(100kg per bag @18 bags))	1800	20	36,000	1800	27	48,600
VARIABLE COSTS						
Cost of land Hire (own land)	-	-	-	-	-	-
Seeds (8kg per acre)	4	450	1,800	4	450	1,800
Fertilize (home manure)	-	-	-	-	-	-
Ploughing	2	3,000	6,000	2	3,000	6,000
Planting	2	250	500	2	250	500
Spraying(weevil control)	1	600	600	1	600	600
Weeding/thinning	1	1,800	1,800	1	1,800	1,800
Harvesting	1	1,000	1,000	1	1,000	1,000
Threshing and Winnowing	1	1,000	1,000			-
Birds	10	250	2,500	10	250	2,500
Packing	4	250	1,000	4	250	1,000
Storage @30 per bag	18	30	540	18	30	540
			-			-
			-			-
			-			-
Other Costs						
TOTAL VARIABLE COSTS			16,740			15,740
GROSS MARGIN			19,260			32,860
ROI			1.15			2.09

NB:

1. One harvests done in one year
2. Sorghum crop is a perenial hence there is no requirment for repeated planting
3. One acre producing 18 bags on average
4. Assume growing one variety of sorghum
5. Transport cost is nil, buyers pick at bulking centre

f) Storage

The survey found out that farmers had rudimentary storage facilities. There was no well-developed storage warehousing and therefore they stored the crop in a room in their homes (for example see Figure 5).

Farmers acknowledged that storage is a way of adding value; they always sell at better prices later. The crops fetched better prices after some months. However it was noted that most farmers did not have good storage facilities.

Proper aggregation and storage makes it possible to sell in



bulk and at the best price and time.

g) Cost of production

Small grains have low cost value chains with relatively good return on investments. The main components of the costs of production are purchase of seeds. The decision to hire land is individually motivated and must be well thought through. The farmers are willing to hire land, which is indicative of farmers' confidence in the lucrativeness of the associated small grain value chains.

h) Impact of using fertiliser on gross margins

The survey indicated that use of fertiliser thought added to the cost of production but on the other hand increased yields almost by double, hence bringing about a positive gross margin. Farmers also said that they are now practicing crop rotation and the reason they gave is that this allows soil time to rejuvenate. There is a lot of misinformation on the effect of fertilizer use on the environment.

i) Access to climate information

With access to climate information informing farming, farmers are able to combine their local knowledge with science in order to anticipate rain and drought. Most farmers in the project indicated that they have been given the opportunity to access climate information which provides information on: when to plan, harvest, ploughing etc. The survey established that frequency of feedback varies greatly (Figure 6). 57% of farmers said that information is received within a day. Farmers noted that the system can be improved to make it timely.

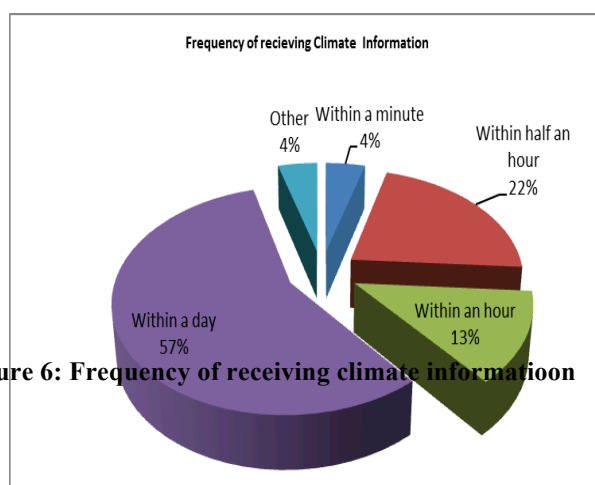


Figure 6: Frequency of receiving climate information

j) Availability of seed and seed variety

The findings of the survey is that "Gadam" sorghum seed developed for the Mbeere region is yielding results that prove it is an apt variety for this agro-ecological niche. The small grains have so far proven to suit cultivation in Kenya's semi-arid Mbeere region. The farmers experienced better yields when they planted Gadam.

k) Access to Markets

The study findings on access to markets were that small grains compare very competitively with the average prices of the main food crops in Kenya i.e. Maize and beans. In this survey I visited some local marketing offices to get the data of average prices of the commodities

over the last 4 years. The prices of maize range from 30-40 Kes/Kg, while those of sorghum range from 40-45 Kes, showing that both sorghum and maize can earn farmers a good price if marketed. Those of beans and millet however are higher at between 70-75 Kes. Comparisons of crop prices over the past 4 years indicates that there has not been any major fluctuation in any of the crop prices (Figure 7).

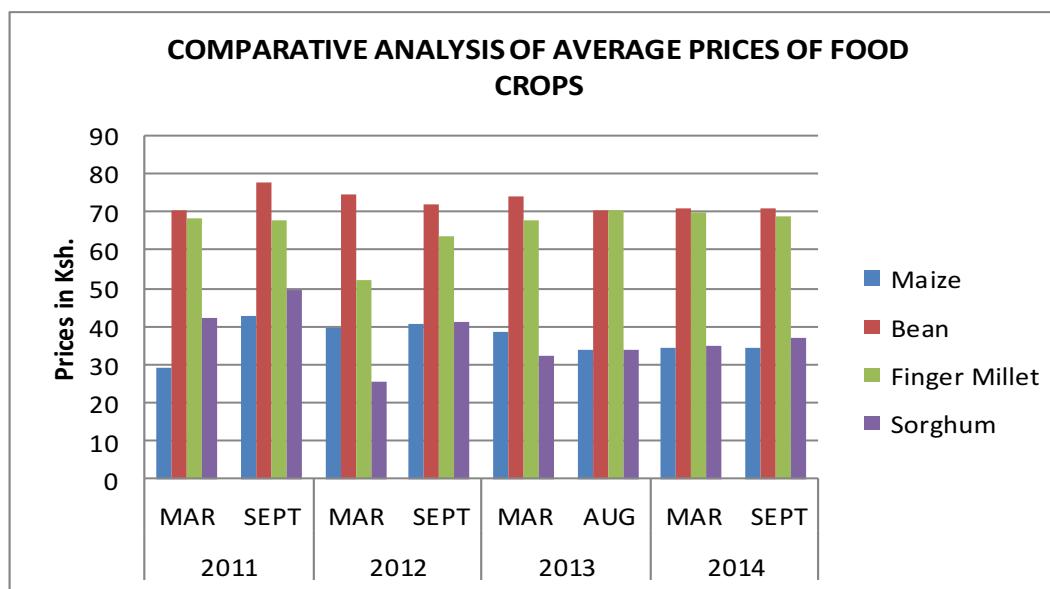


Figure 7: Comparing on farm prices of main grains in a farm

5.2 Demonstration farms

Information on demonstration farms was gathered from demo farms already set up in the first phase of the project. In this case this report looked at 2 demo farms that were set up in the last season. Demo farms have proven to be an effective teaching technique for farmers to demonstrate important of planting drought resistant crops.

The Demonstration Farm is a living classroom, showcasing over a dozen practical techniques. More than simply telling farmers about sustainable concepts, the Demonstration Farm shows them what works, how it is done, and enables them to envision ways to incorporate these techniques on their own land.

Some of the activities that were carried out in demonstration involved learning about:

- Planting using improved variety of seed
- Proper plant spacing
- Land planning and management techniques
- Intercropping sorghum and green grams
- Use of composting in dry lands to improve soil quality and enhance production



- Water harvesting technologies

5.3 Climate Information Needs for farmers

A climate information system was established for supporting farmers. The system has over 800 farmers subscribed. The farmers receive vital weather information to enable them plan for farming. The system uses mobile technology for dissemination of weather information. Based on their location, it would be costly to deliver such information by other means. The message is delivered through an SMS system to multiple farmers, with room for farmers to give feedback through replying to a manager via the system. The farmers enjoy seasonal, monthly, fortnightly, and weekly forecasts depending on weather severity and activity on farm with time. However, obtaining feedback from the farmers, be it confirmation of SMS receipt or the usefulness of the information, has been a challenge.

The climate information disseminated covers different kinds of information according to the farmer's needs, such as:

- The kind of seed to plant and the time of planting so as to utilize the best of the rainy season.
- Farmers are also advised on the manner in which to prepare the land and manage any anticipated adverse effects.
- On disaster-risk reduction, it informs people to prepare for emergencies from the weather.
- It also helps advise farmers on the best period to carry out certain operations.
- It informs the farmers about good times for spraying, to make effective use of pesticides, for example periods when the soil is damp but it is not likely to rain.
- On the other hand fertilizers are best applied when wet or rainy.

After talking to farmers and the managers of the climate information, it was established that the current design of the information services to farmers can be improved to enable farmers to benefit more – details of recommendations for improvements are provided in the following sections.

6. Discussion and Recommendations

Production

For production of small gains to improve, it is important to carry out training of farmers on good agricultural practises using sorghum, millet and green grams. This would also provide a platform for testing and demonstrating the now famous “Gaddam” sorghum hybrid seed that has proven to be the best in the region. The improvement of agricultural productivity calls for holistic training for farmers on land preparation, planting, spraying, pest control, harvesting and water and soil conservation, including conservation farming techniques

Commercial Opportunity

The study has provided some recommendations that will build the resilience of traditional grains growing communities by providing new premium markets and also improving the image of the grains. This will serve to increase the general demand for traditional grains. Traditional grains are adapted to grow on marginal lands without irrigation, pesticides, or fertilizers, and are thus more sustainable and resilient than most modern commodity crops. By promoting traditional grains, we are also promoting a crop that has low water intensity. Good prices are a factor of proper storage to prevent loss of produce and to maintain quality, better bulking/aggregation and good market linkages. This goes well with high production volumes to attract brewing companies and international export markets. Individual farmers can only realize this through their marketing associations since collectively they have the volumes of produce, and therefore a stronger voice, to shift power from price acceptors to price controllers.

Food security

Increasing diversity of diets is good for national food security. As pointed out by the National Geographic Magazine, today, (By Andrea Stone, for National Geographic PUBLISHED JULY 8, 2014) the world has more than 50,000 edible plants, yet just three commodity crops—rice, maize, and wheat—provide 60 percent of the plant-derived calories eaten. With such heavy reliance on so few foods, the consequences of crop failures due to disease, drought, floods, and other catastrophes that could be driven or exacerbated by climate change, result in greater food insecurity for the planet. Making traditional grains popular is important to improving diversity. More investments should invest in these.

Gender equality

Small grains are not mainstream commercial value chains, hence they provide an opportunity for women and youth to participate and earn equitable incomes. In terms of labour contribution, men are more involved in the field production of sorghum in the three regions sampled in this study compared to women. Women were heavily responsible for post-harvest handling which generally included threshing, winnowing and storage.

Government support

There is also some good will for the government to set up better equipment for weather monitoring if they can get support. This project will continue liaising with other partners to find out how they can get some better instruments to monitor weather locally. A partnership will be developed with ICT providers to improve the current climate information system.

Climate Information Services

The climate information is a great innovation in Mbeere. It is recommended that the information content could be increased and the design of dissemination reviewed to include a feedback mechanism and an interactive platform. Currently it is one way and only offers information from the station to the farmers. The farmers said they will appreciate getting an opportunity to have interactive conversation and ask specific questions regarding diseases, soil fertility etc. This recommendation is to have the system reviewed and enhanced with new features that can accommodate the changing needs of farmers.

Other climate mitigation interventions

In addition to adoption of drought resistant crops, farmers are encouraged to adopt holistic approaches to climate mitigation such as the planting of trees in their farms. This is geared towards improving moisture content of the soils and maintaining water catchments, thereby maintaining some humidity. Perhaps if feasible, water harvesting technologies can also be adopted to support household save water whenever it rains for drinking and other home use.

Sustainability

For sustainability of these interventions to be attained, farmers will need to be trained to support their existing systems when donors exit. This can only be done if farmers are well organised into marketing groups and these groups each contribute a small fee to maintain the systems for climate information dissemination. That is why this study has dwelt on the marketing aspect of these drought resistant crops, as money becomes an incentive for them to grow more of these crops.

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7. Conclusions

One of the priorities noted in Christian Aid's *Partnership for Change* strategy is to build on partners' experiences in livelihoods, climate resilience and disaster risk reduction work to develop integrated resilient livelihoods programmes. With the support of its donors, Christian Aid is doing this, and helping vulnerable and marginalised people around the world to build thriving livelihoods that are resilient to the many risks, shocks and stresses that they are regularly exposed to. Christian Aid understands a resilient livelihood to be one that enables people to **anticipate, organise for** and **adapt to** change, good or bad, sudden or slow.

Christian Aid is at a point of scaling up the current work from the previous project (SALI). The idea is to use lessons learnt and widen the scope to support over 20,000 smallholder farmers. Key lessons learnt include the need to support farmers to adapt to changing climate by enabling them to access up-to-date and reliable information on changing weather patterns. This will enable them know how to cope and maximise benefits. Private sector partnerships will enable the projects to explore efficient means of information dissemination.

Secondly, in the attempt to commercialise sorghum and green grams value chains, the desire to enhance the economic participation of farmers in an agricultural value chain doesn't necessarily translate in enhancing the trading roles (running a business venture tasked with issues of logistical movement of produce from a multiplicity of farmers, aggregation of produce at central points, aggressively seeking out competitive markets and transfer of funds from one farmer to another) that farmers should play, but rather in streamlining the flow of the product at the least cost to the farmer and at higher returns.

The third lesson is the need to improve quality of market system partners. This implies that choice of partnerships should be based on value added - the choice of project partners must be based more on economic sense and the viability of the outcomes of the actions, rather than on the mobilisation capacity of the partnerships. On this basis, the necessity of enhancing the role private sector players' play in streamlining a value chain is of importance, but the private sector player must invest in the value chain to create a win-win situation.

The last and most important lesson is that projects need to ensure sustainability when donor funds dry up. This means that strong local institutions should be created and existing institutions strengthened to ensure they provide all the required services to farmers. Some of the services could be farmer trainings, access to markets, access to inputs and information. Christian Aid will be working with many stakeholders in the small grains value chains to ensure that the local systems are strong enough and have adequate resources and capacity to go on when donor funds are no longer available.

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Annex

INTRODUCTION AND CONSENT

Hello, Thank you for giving us your time. We are working with Christian Aid to support smallholder farmers. We would like to ask you some questions to better understand sorghum, millet and green grams farming in Kenya. **The survey will take about 30 minutes.**

A: IDENTIFYING INFORMATION (To be filled by the interviewer)

1.1	QUESTIONNAIRE NUMBER	_ _
1.2	DATE OF INTERVIEW/SURVEY	_ _ _
1.3	NAME OF THE INTERVIEWER	_ _ _
1.4	COUNTRY	_ KENYA _
1.5	REGION	_ _ _
1.6	MOBILE PHONE NUMBER	_ _ _ _ _

B: HOUSEHOLD INFORMATION

2.1	FARMER NAME	
2.2	GENDER	1. MALE 2. FEMALE _
2.3	AGE BRACKET	1. <30 2. 30-50 3. >50 Estimate for those who don't know) _
2.4	HOUSE HOLD HEAD	1. YES 2. NO _
2.5	HIGHEST LEVEL OF EDUCATION	1. PRIMARY 2. SECONDARY 3. TERTIARY 4. NONE _
2.6	DEPENDANTS ON THE FARMING	1.2 people or less 2. 3-8 people 3. > 9 people _
2.7	FARMER ASSOCIATION NAME	
2.8	MOBILE PHONE NUMBER	_ _ _ _ _

C: GENERAL AGRICULTURAL INFORMATION

3.1	What proportion of land do you use for farming sorghum/millet/green grams?	(Indicate the size in acres , 1 Ha = 2.4 Acres) 1. <1 2. 1-5, 3. 6-10, 4. >10
3.2	Do you legally own the land? If not why?	1. Yes 2. No Why (hired, communal, etc,)..... _
3.3	Is the sorghum/millet/green grams farming activity you engage in your main occupation? If not, what's your main occupation?	1. Yes 2. No (Please specify) _
3.4	What is the main source of water for your agricultural activities in each season?	1. Rain, 2. Surface irrigation, 3. Groundwater irrigation, 4. rain and irrigation _
3.5	Your farming is.....	1. Mono-cropping 2. Mixed Cropping 3. Other specify..... _
3.6	Do you grow sorghum/millet/green grams for food or commercial purposes?	1. Food crop 2. Cash crop 3. Both _

D: VALUE CHAIN INFORMATION: - (SORGHUM/MILLET/GREEN GRAMS)

(i) **Production and income:** (NOTE FOR THE INTERVIEWER: Get the farmer to recall from previous seasons or experience where they answer they don't know)

4.1	Are you aware of the quality standards expected of your products? (e.g. GAP, GPP, KEBS, NCPB, KEPHIS, NEMA e.t.c)	1. Yes 2. No _ _
4.2	What was your total yield of sorghum/millet/green grams last season? (State respectively)	(Specify in Kg) _ _ _ _ _ _

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4.3	What proportion of your yield did you keep for consumption from the last cropping season? (State respectively)	(Specify in Kg) _ _ _ _ _ _
4.4	How much (quantity) approximately did you sell from your last yield? (State respectively)	(Specify in Kg) _ _ _ _ _ _
4.5	How much on average were you selling per kilogram? (State respectively)	_ _ _ _ _ _
4.6	Do you keep a record of your production costs? If no, why?	1. Yes 2. No Why..... _ _
4.7	What was the total cost of production last season? (inputs + services + labour) (State respectively)	_ _ _ _ _ _ _ _
4.8	How much income do you gain from sorghum/millet/green grams farming? (State respectively)	_ _ _ _ _ _ _ _

(ii) Inputs and Labour:

5.1	Which kind of seed did you use last season?	1. Savings from last season 2. Improved and recommended certified hybrid 3. Other specify _
5.2	Did you use recommended inputs last farming season? If yes, state	
5.3	How do you access your inputs?	1. Government 2. Local partners 3. Local Agro dealers 4. Other Specify..... _
5.4	Do your input suppliers offer information on the use of inputs?	1. Yes 2. No 99. Don't know
5.5	Do you hire or ask for help with labour from someone outside your household?	1. Yes 2. No _
5.6	For which of the following activities do you source labour for? (Fill all the choices applicable in the troughs provided.)	1. LAND PREPARATION 2. PLANTING 3. WEEDING 4. HARVESTING 5. SPRAYING 6. OTHER..... 2. _ _ _ _ _ _ _
5.7	Are input suppliers biased by gender or any criteria as to whom to supply?	1. Yes 2. No If yes, explain..... _
5.8	How much did it cost you to purchase all inputs last season? (farm inputs + labour)	

(iii) Technology, Technical capacity & Husbandry

6.1	Do you obtain climate information?	1. Yes 2. No _
6.2	Do you adapt it to your farming?	1. Yes 2. No If no please explain _
6.3	Which dissemination channels are used? (Tick all the choices applicable in the troughs provided.)	1. SMS 2. Radio broadcasts 3. Newspapers 4. Seminars 5. Television 6. Social Networks 7. Word of Mouth 8. Other (Specify)..... _ _ _ _ _ _ _
6.4	Which information channel best informed your practise? (One whose content benefits the most)	1. SMS 2. Radio broadcasts 3. Newspapers 4. Seminars 5. Television 6. Social Networks 7. Word of Mouth 8. Other (Specify).....
6.5	Did you use any kind of mechanization at any point of your cropping cycle last season?	1. Yes 2. No (If yes, Specify e.g. tractor tillage. e.t.c)..... _
6.6	Do you have skills towards SALI farming?(Tick all applicable)	1. Pre harvest husbandry 3. Post-harvest husbandry, 4. Soil/Water conservation, 5. Land rehabilitation 6. Other _
6.7	Do you usually practice crop rotation on your farm?	1. Yes 2. No 99. Don't know _
6.8	Did you lose any crop? (From poor storage, diseases, pests, failure to sell etc.)	1. Yes 2. No If Yes, Specify in Kg _ _ state the reason.....

(iv) Diversification:

7.1	Do you grow any other crops?	1. Yes 2. No If Yes. List them..... _
7.2	Do you rear animals?	1. Yes 2. No If Yes. List them..... _
7.3	On average how much additional income per month?	
7.4	Interviewer to perform an open observation (but in secret from the farmer) on the farmers living conditions, general assets, house and home infrastructure and make notes	

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(v) Challenges:

8.1	What are the major problems you faced last season with regard to sorghum/millet/green grams farming?	1. Lack of technical capacity/skills, 2. Lack of access to credit, 3. Lack of access to inputs, 4. Inadequate labour, 5. Poor access to extension services, 6. Poor access to markets, 7. Unfavourable government regulations/policies, 8. Poor infrastructure (roads, communication e.t.c.) 9. Lack of support services (e.g. storage, climate information) 10. Other (Specify)..... 4. . <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
8.2	What are the major strategies you used to tackle problems you faced?	

E: SERVICES: (i) Agricultural support Services

9.1	Have you received advice/information/training on sorghum/millet/green grams husbandry, or soil and natural resource management from (source) in the last 12 months? (Fill all the choices applicable in the troughs provided.)	1. Friend/neighbour/Fellow farmer 2. Farmer group 3. Local Partners 4. Extension agents 5. Media 6. NGOs and development agencies 7. Research and Development institutions 9. Other specify <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9.2	Do you pay for the services offered?	1. Yes 2. No <input type="checkbox"/>
9.3	Do you get agricultural extension services	1. Yes 2. No <input type="checkbox"/>
9.4	Are there cases of child labour?	1. Yes 2. No <input type="checkbox"/>

(ii) Producer Organisations

10.1	Do you belong to any membership groups in this community specifically for your sector? (farmer groups, merry go- round, CBO/FBO)	1. Yes 2. No, <input type="checkbox"/>
10.2	Are you an active or inactive member of the group?	1. Yes 2. No <input type="checkbox"/>
10.2	Do you have an elective post?	1. Yes 2. No, <input type="checkbox"/>
10.3	What services does the group extend to its members? (Fill all the choices applicable in the troughs provided.)	1. Obtain Inputs, 2. Bulks produce Sale, 3. Farming and business plans, 4. Financial access, 5. Marketing & market information, 6. Climate information, 7. Productivity training, 8. Other..... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
10.4	Are you happy with the services you receive?	1. Yes 2. No <input type="checkbox"/>
10.5	Volumes of product sold through group market linkages	Specify in Kg <input type="checkbox"/>
10.6	Is the group insured against loss or disaster management?	1. Yes 2. No <input type="checkbox"/>
10.7	Does the group participate on dialogue about policy/regulatory issues affecting SALI farming?	1. Yes 2. No <input type="checkbox"/>
10.8	Are there women representatives in the PO organizational structure?	1. Yes 2. No <input type="checkbox"/> How many? <input type="checkbox"/>
10.9	How many demand activation undertakings in trade fairs, competitions, and demo farm instruction have you attended?	
10.10	What plans does the group have on farming, financial, marketing, input sourcing, training, climate information e.t.c.	

(iii) Market Access (Tick all that apply in the provided troughs)

11.1	Did you have any difficulty selling your produce?	1. Yes 2. No <input type="checkbox"/>
11.2	Where did you get information about prices of your produce? Did this information help you in your selling decision? (tick all that apply)	1. Friend/neighbour/Fellow farmer 2. Farmer group 3. ADS providers 4. Extension agents 5. Media 6. Other specify..... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Helped? 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/>
11.3	How many market contracts/buyers are you/is your group associated with?	You <input type="checkbox"/> Group <input type="checkbox"/>
11.4	What type of markets do you trade your products?	1. Formal 2. Informal 3. Both <input type="checkbox"/>

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11.5	How many Kgs do you sell to	Sorghum 1. Formal local market _ 2. Informal local market _ 3. International Market _ Millet 1. Formal local market _ 2. Informal local market _ 3. International Market _ Green Grams 1. Formal local market _ 2. Informal local market _ 3. International Market _
11.6	Do you meet and exceed the demand or fall short of the demand?	1. Meet and exceed demand by _ Kgs 2. fall short of demand by _ Kgs
11.7	How do you transport your products to the buyer/market?	1. On foot 2. Vehicles 3. Middlemen 4. Sells on farm 5. Bicycle/motorcycle 6. Cart 7. Other specify _ _ _ _ _ _ _ _
11.8	With regard to selling and marketing your product what challenges do you encounter?	1. Lack of marketing capacity/skills, 2. Lack of access to credit, 3. Poor road infrastructure, 4. Poor communication and network infrastructure, 5. Poor market infrastructure, 6. Unfavourable government market regulations/policies, 7. Lack of support services (e.g. storage, market information) 8. Other (Specify)..... _ _ _ _ _ _ _ _
11.9	Do women and women headed households have equal market access opportunities?	1. Yes 2. No _
11.10	Do you keep sales and profitability records?	1. Yes 2. No _
11.11	No of collecting centres and or warehouses?	_

(iv) Finance Access

12.1	What services do financial service providers offer to farmers in your area?	
12.2	Are their services affordable/ usable? (loan interest rates, account charges e.t.c)	1. Yes 2. No 3. Never tried _
12.3	Do you/does your group have an account with a financial institution (e.g. Sacco, cooperative, bank)	You 1. Yes 2. No _ Group 1. Yes 2. No _
12.4	Did you receive any of the inputs or service on credit during the last 12 months? (Fill all the choices applicable in the troughs provided.)	1. Seeds 2. Fertilizer 3. Pest and disease control chemicals 4. Any mechanization service (I.E tractor ploughing, spraying, machine harvesting e.t.c) 7. No 8. Others _ _ _ _ _ _ _
12.5	If yes, from whom did you receive it from?	1. Farmer coop 2. Input supplier 3. ADS Providers 4. MOA 5. FRIEND/FAMILY 6. NGOs 7. OTHER _ _ _ _ _ _
12.6	Do women get equal opportunities to access financial services?	1. Yes 2. No _
12.7	Have you ever borrowed a loan for your agricultural activities from	1. Relatives/friends, 2. SHYLOCKS, 3. FBO 4. Bank, 5. Micro Finance Institutions 6. Others _

F: ENABLING ENVIRONMENT

13.1	Are you aware of policies, laws & regulations governing sorghum/millet/green grams farming practise?	1. Yes 2. No _
13.2	With regard to the legal and regulatory framework, are there regulatory/policy issues that are an obstacle to your agricultural activities?	1. Market fees, 2. Licence charges, 3. Import-export regulations 4. Tax 5. Certification bureaucracy 6. Unfavourable laws/policies 7. Other specify..... _ _ _ _ _ _
13.3	Recommendations on possible solutions	
13.4	Do you actively participate in policy dialogue?	1. Yes 2. No _