Sorghum: key to food security and commercial markets

Sorghum is a drought and heat-tolerant cereal crop which grows well in climatically variable and ecologically fragile environments where other crops, such as maize, are less viable. It also requires minimal external inputs and provides for increased soil cover when intercropped with legumes.

According to Kenya's Vision 2030, sorghum contributes approximately 4% of the total cereal crop production\(^1\) in Kenya. It is estimated that Nyanza alone produces 52% of all sorghum grown in Kenya, with Western Kenya producing 23% and Eastern and the Coast regions accounting for 25% of production.

Sorghum is becoming an important crop to meet increasing demand for food within Kenya and the region; for international processors blending and fortifying food products; as starch for industrial processes; and for manufacturing of cheap beer. In the FICCF pilot the production of sorghum-based beer by East African Breweries Ltd (EABL) in conjunction with a Government of Kenya subsidy has increased demand for sorghum in Kenya and is leading to greater organisation in the value chain. For industrial purposes the preference is for white sorghum but end buyers supplement with red sorghum when the supply of white is insufficient.

This brief summarises the sorghum pilot achievements and impacts from 2016 to 2017.

Sorghum supply chain partnerships

The sorghum pilot focused on three counties in Western Kenya (Kisumu, Homa Bay and Siaya). The sorghum supply chain partnership model is illustrated in figure 1.

FICCF provided “seed capital” to Rafiki Microfinance Bank to stimulate onward lending to aggregators and smallholders along the sorghum value chain. This approach aimed at greater financial inclusion and investment in climate-smart agriculture.

Key Takeaways

- Sorghum offers significant investment potential for small-scale farmers and the private sector due to its uses as food, biofuel and as a starch source for alcoholic beverages.
- Sorghum is an attractive alternative to maize as it is more resilient to drought and heat.
- The Finance Innovation in Climate Change Fund (FICCF) strengthened the sorghum value chain by facilitating access to commercial loans, agro-inputs, technical and advisory services, and risk management strategies.
- As a result of financing through Rafiki Microfinance Bank, over 4,000 sorghum farmers in Kenya invested in improved seeds, fertilizer and pesticide management, intercropping, post-harvest technologies, and water and soil management practices.
- Downscaled weather advisories enabled farmers to better plan their planting and harvesting windows and those who adopted the recommended practices saw greater returns on investment.
- A hybrid crop insurance (weather index and multi-peril) was tested and provided an added incentive for investing in sorghum farming.
- Farmers are adopting more climate-resilient practices such as green gram intercropping as a result of the technical extension services, which have resulted in greater security of investment and higher incomes.
- The loan repayment rates of farmers were higher than industry norms due to aggregator strategies such as prompt payment on delivery of harvest to the collection point.
- Establishing strong relationships between the aggregator and farmers has been key to success.

\(^1\) 170,000 Mt of 4,400,000 Mt total cereals in 2014 (FAOSTAT).

Figure 1: FICCF sorghum supply chain partnership model
The FICCF loan portfolio operates as a revolving fund where repayments are on-lent by MFIs to new and existing customers.

Over the pilot term, Rafiki entered into commercial partnerships with five sorghum aggregators with existing relationships with sorghum farmers. Aggregators took loans at a competitive commercial interest rate of 8% per crop cycle, (6 Months). On-lending to farmers was in the form of inputs rather than cash. Aggregators built in a mark-up for the cost of the inputs to absorb financing and administrative costs of input provision. In some cases, aggregators organised their loans to individuals within a group of 20 farmers to ensure a co-guarantee by each group member. The aggregator committed to buying the harvest and deducted the cost of the inputs from the payment to the farmer.

A technical support grant component providing seasonal agro-weather advisories and complementary technical CSA services ran in conjunction with the loan program. The technical services covered good agricultural practices as well as agro-ecological and climate resilient agriculture best practice (see Table 1).

FICCF developed a close working relationship with the Rafiki Microfinance team to support the analysis of the credit worthiness of the aggregators. In addition to the information required for a credit analysis, the aggregator provided a detailed list of the farmers with which they are working and proof of the contracts that they have signed with end buyers such as EABL. Some aggregators used the services of an ICT platform provider to capture farmer profiles.

Where collateral was available to support the loan, the process of registration of the collateral commenced. Where required, FICCF provided partial guarantees to accelerate release of finance whilst the collateral was being formally registered.

Climate Information Services

Once seasonal forecasts are made available at the national level by Kenya Meteorological Department in advance of the long and short rains, the County Meteorological Officers can then prepare downscaled county level forecasts. Working together with agricultural specialists and other relevant stakeholders (Government, civil society or private sector), these downscaled forecasts are then used as the basis for developing agro-weather advisories for the season. Lead farmers participate in sharing weather and climate information through participatory climate scenario planning processes for downscaled seasonal climate forecasts. As a result, planting windows for crops (specific dates in the calendar) and the climate risks associated with each planting window can be determined. Once the agro-weather advisory is agreed, the information is provided via SMS to farmers through their aggregators and agreed lead farmers.

Innovative hybrid insurance

FICCF facilitated the development of a novel rainfall and multi-peril insurance product covering the output-based value of the crop. A first round of farmers who accessed loans were given the option to take this insurance cover for the 2017 long rain season: 156 farmers covering 310 acres of sorghum availed of the policy following insurance training.

The insurance policy was developed jointly by APA Insurance and Agriculture and Climate Risk Enterprise (ACRE) Africa Ltd following significant discussions with FICCF, aggregators and farmer leaders. Premium calculations were informed by several factors including climate information (forecast from KMD, satellites, automated and historical) and weather information analysed by actuaries at...
ACRE Africa. The weather index was based on rainfall triggers while the multi-peril crop covered extreme events and pests such as Quelea birds and Fall Army worms and events not covered by weather index (such as water logging). Weather related losses were assessed using satellite data, whereas peril related losses were assessed through on-farm spot checks. Premiums were calculated based on projected harvests. For instance, APA’s premium cost 10% of the projected income for the March – May season – the farmer paid 50% of the premium and FICCF subsidised 50% during the pilot period. E.g. if the projected harvest was 15,900 kg of sorghum – priced at KSh 26/kg – (total crop value was 351,000 and the policy premium cost was KSh 35,100.

Pilot Performance and Impacts

Value Chain relationships

- Rafiki Bank provided loans to five small agribusinesses (aggregators) who on-lent to over 4,000 sorghum farmers.
- Farmers invested in improved seeds, fertiliser, pest management, post-harvest technologies, labour-saving technologies, and improved water and soil management practices.
- The presence of a strong “anchor buyer” (EABL and the Japanese noodle firm) with growing demand for sorghum translated into aggregators being able to pay farmers stable market prices.

- Farmers expanded acreage under sorghum as a result of the seed loans provided and the secure market.
- The aggregator laid the infrastructure by establishing collection points from which farmers could collect inputs and for harvest delivery, enabling new farmers to engage in semi-commercial production for the first time.
- Rafiki is now exploring ways of providing loans to both aggregators and direct to large scale farmers in future years as they strengthen their relationship with actors along the value chain and increase opportunities for other loan products.

Productivity gains

- Sorghum farmers who used improved seeds supplied through the aggregator and who applied advice received from extension, demonstration and climate advisories experienced higher germination rates and better yields compared with farmers who did not.
- As a result of access to these services, some farmers have reported increased productivity from 8-9 bags of sorghum/acre to 15 bags; representing an additional 15,000 KSh (150 USD) per acre.

Reduced post-harvest losses

- Threshing, often a labour-intensive aspect of sorghum processing, was made easier by the use of a mobile mechanical threshers, made accessible to farmers by the aggregator.
- Farmers readily adopted the hermetically sealed storage bags (Purdue Improved Crop Storage (PICS)) introduced to them by the aggregator replacing chemical preservation and traditional storage methods.
- Collection of produce from the farmers was done shortly after threshing, leaving no window for post harvest losses.
- The farmgate collection strategy by the aggregator played a role in minimising transportation related losses and side-selling.
- The introduction of mechanised threshing reduced the workload of women.

Better decisions and de-risking measures

- Through technical services farmers acquired skills on optimal seed spacing and row planting which contributed to increased productivity without expanding land use.
- Agro-weather advisories together with cropping calendars helped inform farmer decisions (and was often extended by farmers to other crops).
- 85% of the farmers interviewed reported satisfaction with the weather information provided, derived from a combination of indigenous forecast techniques and meteorological forecasts.

Resilience building

- By incorporating weather advisories in decision making, farmers have reduced the risks associated with drought and other seasonal factors.
- Uptake of hybrid insurance by farmers has de-risked investments.
- Improved post-harvest techniques have resulted in reduced losses.
- Farmers have adopted new climate-resilient farming practices (see Table 1) as a result of farmer to farmer demonstration and training days organized by the technical services provider CARD.
Key Lessons
A private sector response to increasing CSA investments for adaptation / resilience with low carbon benefits relied on a mix of flexible and innovative approaches.

The following lessons emerged from the FICCF CSA Sorghum pilot model:

Integrating impact enablers
- The pilot demonstrated that integrating enablers such as technical assistance and capacity building, strategic partnerships, aggregation, incorporating climate information services and de-risking farming through insurance are as crucial as access to finance.
- Embedded strategic technical assistance capacity and de-risked processes make long-term sense – create conducive environments for insurance driven by a private sector approach.
- Establishing the right pricing structure for agricultural inputs and services to cover transaction costs and risks of service providers are key.
- Regular agro-weather information updates help in agricultural planning - climate/agro weather information and agribusiness insurance cover to inform their production and to adopt adaptive/resilient practices.

Relationship building
- Aggregators play an important role but need to have a vision as a long-term business and understand the significance of working in an ethical manner with farmers.
- Establishing good relationships between the aggregator and farmers is essential and can be done through timely provision of quality inputs, enabling access to relevant information, transparent and timely payments upon product delivery.
- Success in any one value-chain is contingent on managing good relationships between all parties.

Capacity and resilience building impacts
- FICCF strengthened the institutional capacity of MFIs and agricultural entrepreneurs to deal with the implications of increased climate variability in farming.
- Accessibility to insurance products covering weather risks and pest hazards can increase financial inclusion and system resilience.

Smallholder buy-in features
- Prompt electronic money transfers by the aggregator for the bulk of the crop added to the success
- High market demand for the white variety of sorghum enabled a strong “pull factor” in the value-chain.
- Collection centres facilitated by the aggregator played a role in minimizing transportation related losses and acting as input collection points.

Shift in farming practices features
- Farmers have used their understanding of climate and agro-weather information and agro insurance cover to inform their production practices and choices.
- The aggregator arranged the delivery of improved seeds directly to the community.

Potential for going to scale
Unlocking the future of sorghum as a climate-smart value chain commodity in a changing climate will require the following actions:

Partnership building and management
- Establishing linkages with end market buyers which ensures farmers produce what is demanded. It is essential that the MFI teams also develop their understanding of these markets.
- Facilitating long term relationships to build confidence and trust between MFIs, aggregators and small holders.

Mature relationships allow MFIs to understand the lending patterns for smallholders and to reduce some of the demand for collateral.
- Having an independent development facilitator to manage that process has been key and valued by all parties. Scaling up initiatives such as “check-off systems” and farmer group guarantees will be essential to grow lending in the value chain.
- Finding new aggregators with skills, capabilities and capacities or attracting new actors into this role is essential.

Sorghum platform
- Creation of a Sorghum platform to build linkages and information sharing among the value chain actors – FICCF is working with other stakeholders to create this.
- Engagement of researchers, government and other stakeholders in action research to grow the value chain.

Technical assistance and capacity building
- Provision of technical assistance, with very close collaboration with farmers, is required to achieve a significant increase in sorghum yields per acre.
- Innovative ways of costing and financing capacity building of farmers and value chain actors is required. Incorporating the costs into those charged to the farmers or supported by insurance service providers should be explored.
- Strengthening agronomic practices and adoption of mechanisation for all aspects of production from land preparation to harvesting.

Climate information services
- Forecasting for both the long and short rain seasons and development of relevant advisories
- Increased provision of downscaled weather services. The greater the scale in terms of farmer numbers at which the weather information can be provided will influence the cost and the ability to transfer them on.