Field Report on Scaling Climate-Smart Agriculture by Kimatwa Women SACCO in Makindu, Makueni County

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Field Report

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Accelerating Impacts of CGIAR Climate Research for Africa

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Cover image: Kimatwa women SACCO cluster leaders, Credits, Esther Nzuki

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Abbreviations and Acronyms

AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
ASALs	Arid and Semi-Arid Lands
CIAT	International Centre for Tropical Agriculture
CIS	Climate Information Services
CGIAR	Consultative Group International for Agricultural Research
CSA	Climate-Smart Agriculture
FAW	Fall Armyworm
SACCO	Savings and Credit Cooperative Society
WAO	Ward Agricultural Office

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Introduction

Arid and Semi-Arid Lands (ASALs) suffer the most consequences of climate change. These consequences include prolonged spells of drought and unpredictable rainfall patterns. These scenarios necessitate farmers to adopt climate-smart agriculture (CSA) that is localized for them to overcome these challenges. Successfully adapting these CSA innovations requires a multidimensional approach where the farmers learn the necessary information, capacity and finances. The Alliance of Bioversity and International Centre for Tropical Agriculture (CIAT), through the Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project, has made significant milestones in addressing these issues working with Kimatwa Women Savings and Credit Cooperative Society, a women-led farmers' cooperative society in Makindu, Makueni County. The choice to work with this cooperative underscoring the significance role of women in agriculture and their vulnerability to climate change.

The AICCRA project interventions with the Cooperative started in August 2023, where 360 farmers were trained in various aspects of CSA, gender, and the importance of cooperatives. Through the co-designed learning approach, the project team designed an approach for scaling involving training of CSA Cluster leaders as champions and trainers, setting up learning sites using the Mother-Baby Approach, use of mechanization, improved seed, and locally adapted sustainable soil management strategies.

Linking with the County Extension Officers, the cooperative established nine CSA Clusters, that are serving as demonstration sites for learning. Some CSA innovations implemented in these demonstration sites included climate-smart land preparation innovations such as the use of planting basins, *Zai* pits, and ripping; growing climate-smart crop varieties adapted to the region and practicing innovative crop diversification approaches crop. These farmers bundled these technologies for sustainability, diversification and nutrition purposes. The farmers have integrated at least one innovation (intercropped) in their demonstration site with cereals (maize and sorghum) and legumes (common beans, green grams, cowpeas, pigeon peas). The nine clusters implemented these innovations in strategic areas proximal to most farmers for learning purposes.

A field visit was organized to Makindu in Makueni County with the objective of assessing the progress made in implementing and scaling climate-smart agriculture innovations by Kimatwa Women SACCO. The AICCRA team comprised of Dr. Boaz Waswa, Bwema Ombati, and Esther Nzuki. The AICCRA team and the leadership of Kimatwa Women SACCO held field visits and a feedback meeting to reflect on the achievements, challenges, and opportunities to ensure wide and successful scaling of CSA. This report highlights the progress and lessons learned as AICCRA implements this scaling effort with Kimatwa Women SACCO in Makindu, Makueni, County.

Design of the CSA learning

The AICCRA activities involved working with Kimatwa Women SACCO, a cooperative whose majority members are women. This cooperative offers a huge opportunity to scale CSA innovations. The project embraced a co-design learning approach that brought together the community members to be equal collaborators in the design process, building on their strengths as a cooperative and members being part of the process. The process started with sensitization of the cooperative members on issues around CSA. Due to the wide geographical spread of the members, the cooperative proposed the formation of CSA Clusters proximal to the farmers. Nine CSA Clusters were formed, each with a Cluster Leader as a mobilizer and champion. These clusters include Kimboo Stars, Mulili, Kai, Kiunduani, Wendo wa Kathamboni, Yinzau, Kai, Makindu Central and Keni Kya Usini.

Linking with the Makueni County Agriculture Extension officer, the CSA Cluster Leaders were trained on the CSA and establishing the CSA Mother demonstration sites at a central location. This training considered technical aspects of the CSA technologies, farmers' needs, strengths, and resource availability. After training the cluster leaders, they collectively participated in developing the demonstration site and implemented the CSA innovations – land-based, cropping system, and crop-based technologies. The Mother demos comprise of diverse technology combinations from which farmers can select their preferred options.

Having gained knowledge on how to implement these CSA innovations, the Cluster Leaders proceeded to their clusters to establish the Mother demos. It is at this time also that the members of the cluster actively participated and gained practical training on the CSA options. The farmers then selected their own preferred options to establish in their baby demos. The Mother-Baby Approach was adopted as it facilitates co-learning. It brings the technologies closer to the farmers and encourages practical testing by the farmers. The approach promotes farmer ownership of the process and knowledge, making it easier to scale these CSA innovations to other farmers who are not members. The cost of setting up these mother demonstrations is shared, making the work cost effective and sustainable.

Rationale of the structure

This learning model is very important considering the cooperative has many members, making training challenging. Secondly, training the cluster leaders using the co-design approach makes the farmers own the process and knowledge, making it easier to scale these CSA innovations to other farmers who are not members. Thirdly, since the cost of setting up these mother demonstrations, the cooperative model has encouraged the farmers to pool resources to implement these CSA innovations. Through this approach, most Kimatwa Women SACCO have set up baby demos on their farms where they have implemented these CSA innovations. Scaling of these CSA innovations has already been observed as more farmers who are not members of the Kimatwa women have implemented these innovations on their farms. They have been able to borrow ideas from the members of Kimatwa Women SACCO and use them to develop these innovations.

Seed revolving scheme

Research in Kenya has generated diverse crops and varieties that are suited to the dryland areas of Makindu. In a participatory way, the partners selected drought-tolerant crop varieties – maize (*KDV01*), sorghum (*GADAM*), Common beans (N*yota variety- KAD02*),

cowpea (*M66, KVU27*) and green grams (*Biashara and Karembo*) as test crops for the mother and baby demos. The project facilitated access to starter seed packs to be used in the demos. The seed starter packs are to raise awareness of the available varieties, and demonstrate their performance as a way of creating demand for certified seed.

To enhance sustainability, the Cooperative adopted a seed-revolving scheme. In this scheme, member farmers benefit by getting certified seeds up to two packets (2kg each): one for cereals, either maize or sorghum and another for legumes (common beans, green grams, cowpeas and pigeon peas) equivalent to four kilograms. In return, beneficiaries are expected to return five kilograms of each kilogram of seed taken after harvest to be shared with others or sold and money used to buy new seed for the next cycle of farmers. Any surplus grain can also be aggregated and sold to the market, earning the farmers income. The cooperative will be able to sustain itself by selling surplus seed it obtains from its members.

Mechanization Service Provision for CSA

To implement climate-smart agriculture (SA); mechanization is necessary. Some of the CSA innovations implemented by these farmers include ripping, planting basins, and *Zai* pits that require mechanization. Some of the equipment used by Kimatwa Women SACCO members include hand hoes, ox-ploughs, and tractors with a ripper. CSA innovations, such as ripping, are better done using a tractor, which can dig deep and break hardpan, rather than an ox plough. To achieve better results for ripping, the SACCO owns a tractor that it hires to its members. The project supported the cooperative to design a model for tractor hire service provision. Innovatively the Cooperative extended an offer of Rip 1-Get 1 Free ripping, to encourage farmers to adopting tractor ripping services. This has raised awareness and use of the tractor ripping as a CSA land preparation practice. At the same time, this has increased demand for the tractor services earning the cooperative extra income.

Technologies promoted, CSA packages and Choice

A protocol to guide implementation of the demonstrations was developed and discussed with the extension officer, the cooperative leadership, CSA Clusters leaders and the farmers. Some of the technologies promoted include the CSA land-based preparations, such as planting basins, *Zai* pits, ripping using a tractor, and ridges using an ox plough, whereas the drought-tolerant crop varieties include cereals such as maize: [KDV1], Sorghum: [*GADAM*] and Legumes: Common beans: [*Nyota- High Iron and Zinc bean*] Cowpea [*M66, KVU27*] and Green grams [*Karembo*, *Biashara*]. Other technologies include the cropping systems where farmers intercrop cereals and legumes innovatively for crop diversification to enhance productivity, soil fertility, food diversification, and farmers' resilience.

Planting basins

Planting basins are holes dug measuring 60cm (2ft) by 60cm (2ft) by 45cm (1.5ft). After excavation, the subsoil is put aside while the top fertile soil is returned with manure and mixed. Mulch is placed on top as cover allowing the little water to be retained in the soil. The planting basins had a cropping system for the cereal and another for the legume. For cereals (maize, sorghum and millet), each planting station will have 1 seed making a total of 9 plants per planting basin (fig. 1), while for legumes (Beans, green grams, cowpea), each planting station will have 2 seeds making a total of 18 plants per planting basin (fig. 2).

Figure 1: Planting basins with cereal spacing and plant density

Figure 2: Planting basins with legume spacing and plant density

Planting pits/Zai pits

Planting pits involves digging small basins where seeds of annual or perennial crops are planted. They may be planting pits dug in rows using a hoe. Or it can be *Zai pits* dug across flat or gently sloping land to capture runoff. The pits are then filled with mulch, manure and topsoil to increase soil fertility and the capacity of the soils to capture water. The farmers then planted the 3-5 seeds in the pit, where they thin occasionally to the right density upon germination.

Tractor Ripping

Ripping is done using a tractor (fig. 3). The rip line spacing determines the interrow spacing. The current ripper spacing is 75cm. The crops were planted in the rip lines. The inter-row (plant to plant) spacing for cereals was 25cm, with 1 plant per station. The intra-row (plant to plant) spacing for legumes was 20 cm with 2 seeds per station. The depth of the rip lines was adjusted to a depth of 45 cm, which allowed the breaking of the hardpan, allowing rainwater to infiltrate deep and minimize runoff. In addition, tractor ripping allows crop roots to grow deep, accessing more water from the ground.

The crops are usually planted in the ridges (rip lines) for the main crop, while the raised beds have legumes with an inter-row spacing of 20 cm with two seeds per hole. In addition, an extra row of legumes can be planted in the rip lines to maximize spacing and plant population.

Figure 3: Tractor ripping land.

Furrows using ox plough

Alternatively, farmers can do furrows using ox plough (fig. 4). Planting followed the design for the tractor ripping. However, from the field visit, the farrows are not done precisely as the tractor ripping and are not that deep. One major limitation of the furrows by ox–plough is the shallow soil depth that does not break the hardpan. This depth doesn't allow deep infiltration of water, which encourages surface runoff and soil erosion. Moreover, plant roots are shallow and susceptible to early drying of crops in case there is not enough rainfall.

Figure 4: Developing Furrows/rip lines using oxen

Cropping systems

Farmers are used to a common cropping system of one row of a cereal crop alternated with one row of a legume crop. However, the AICCRA project promoted a diverse cropping system to improve crop diversification for productivity, soil fertility and enhance farmer resilience. Some promoted cropping systems include sole crop cereal on rip lines, sole crop

legume on and between the rip lines, a one-by-one row alternate for cereal and legumes, and a two-by-three row alternate of cereal and legume crop intercrop (figs. 5,6,7). Each farmer selected a desired cropping system that integrates the cereal and the legume. These cropping systems were adopted by the farmers practicing planting basins, *Zai* pits, ripping by tractor and furrows by oxen.

Figure 5: Sole crop cereal in planting basins

Figure 6: Sole crop legume in rip lines and on raised beds

Figure 7: Cereal legume 1:2 intercrop

Status of the CSA Demonstrations and Learning Sites

The project team accompanied by the CSA Clusters leaders visited the nine clusters in the three days and recorded progress in all the mother demos. Unlike previous seasons, this season had received above normal rainfall due to the El nino phenomena. Incidences of water stagnation and runoff were evident across the fields.

Farmers had implemented the CSA innovations in all the mother demos, particularly the planting basins and *Zai* pits. These innovations had already established crops with varied cropping systems. In all mother demos, some had sole cereals or legume crops. Others had an intercrop of cereal and legumes – one row of legumes between a cereal crop. Despite challenges such as high rainfall, most mother demos were well-developed, and the crops were at a stage of weeding and applying top dressing to enhance crop growth. There were already signs of pest attacks that required control to limit the spread.

Location of the demos

Most mother demos were located close to the road or closer to markets (fig. 8). This allowed easy access to the members as well as other community members. This strategic position enhances learning and increases buy-in by other members to implement these CSA innovations in their farms. Coincidentally some mother demos were adjacent to where farmers had practiced the usual farming systems, allowing the cluster members to see the difference and have a practical learning example.

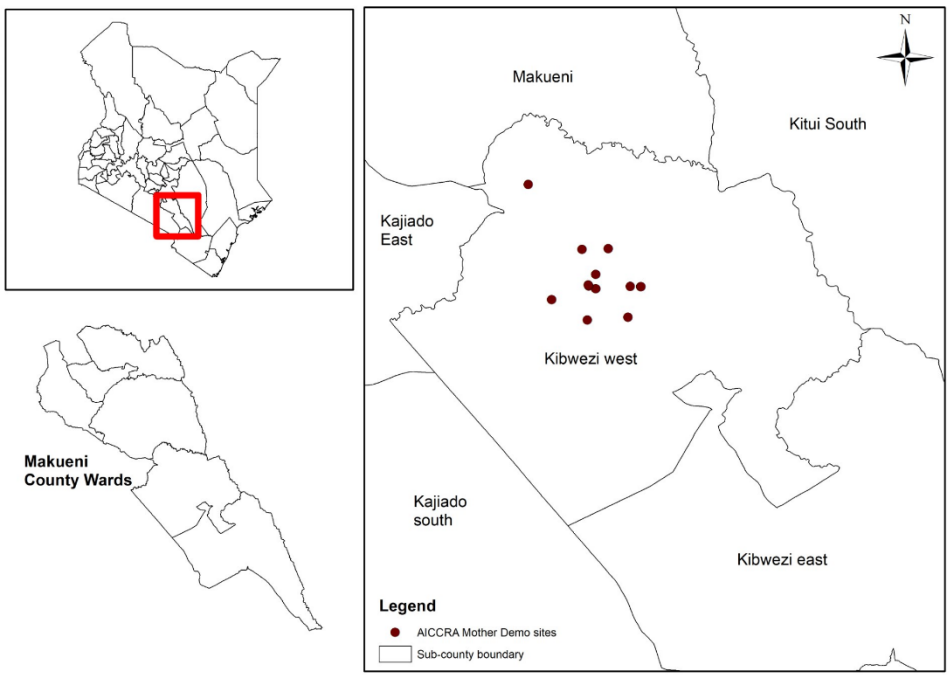

Figure 8: Map of the AICCRA mother demos

Bundling of technologies in the CSA demos

CSA innovations were bundled in these learning sites – technological innovations (crop varieties, land-based technologies, livestock production), organizational groups (farmer group), and capacity building (figs. 9, 10, 11). All the mother demos had implemented the planting basins and *Zai* pits, which they bundled with improved drought-tolerant crop varieties. All the mother demos adhered to the protocol with some integrating farmers modifications. Most farms where the mother demos were, had ripping technologies, although they were farmer-owned. This also allowed the members to learn and compare the three innovations performed. A few of the farmers had done furrows by ox plough and implemented the cropping systems, which also gave a practical learning example for farmers to make better decisions in the future.

Although the standard planting in rip lines was to be in the ridges for the main crop. A few cases were planted on the raised beds of the rip lines. This was a result of the heavy rains that had resulted in flooding of the ridges. Thus, to minimize the effects of water logging, planting on the raised was the better option. Cropping systems varied across farms as farmers intercropped cereals and legumes in different regimes. For cereals, some farmers planted in planting furrows and ridges at a recommended inter-row spacing of 75 cm and intra-row spacing of 20 cm and 2 seeds per hole. While legumes they planted at an inter-row spacing of 37.5cm, intra-row spacing of 20 cm, and 2 seeds per hole. However, regarding intercrops, farmers had varied cropping systems, including sole crop cereal on rip lines, sole crop legume on and between the rip lines, a one-by-one row alternate for cereal and legumes, and a two-by-three row alternate of cereal and legume crop intercrop.

Figure 9: Farmer tending her chicks

Figure 10: Livestock for manure production

Figure 11: Crop production in planting basins

Status and management of the demonstrations

Overall, the establishment of the crop was good (fig. 12). The demos had been established in good time. A few demos recording reduced stand count due to poor germination or damage by squirrels. This necessitated gapping to maintain the plant population. Thinning was recommended especially for the sorghum where the plant population is high. This should be done by removing the weak plants and retaining 2-3 healthy plants in a hole.

To improve soil structure and fertility, farmers were encouraged to use animal manure that was available on the farms. In addition, farmers were encouraged to use crop stovers as mulch and get them back in the planting basins and *Zai* pits as mulch for water conservation.

There were yellowing of crops due to the excessive rainfall and water stagnation in the fields. This was managed through earthing up. Dr Waswa underscored the importance of crop nutrition management for crop health and growth. Advisory was given to the farmers to apply foliar fertilizers and or basal fertilizers after weeding. Combing organic manure with blended fertilizers rich in micronutrients was recommended.

The cluster leaders were encouraged to advise farmers to apply phosphorous-rich fertiliser at the recommended rates during planting to boost crops when young. Farmers were advised to use blended fertilizers with macro and micronutrients (e.g. Yara Microp Planting, Yara Mila Power, Baraka Planting, etc.) – this could enhance optimal root development. After the emergence of the crops, the cluster leaders were asked to advise farmers to do top dressing using inorganic fertilizer, for instance, Yara Microp Top Dress, at approximately 4-5 weeks after planting for the case of cereals or when the crop has about six leaves. For the legumes, farmers were advised to apply vegetative foliar fertilizer 2 weeks after germination (10-14 days) and Flower and Fruit foliar just before flowering (25-30 days) such as EasyGro and Wonder Gro. Application of these vegetative foliar should be made either early in the morning or late in the evening when crop stomata are open to enhance the effectiveness of the foliar fertilizer.

Despite the rapid growth of weeds occasioned by the high rainfall, the majority of the farmers had managed the weeds in most demos and on their farmers. Weeding was done by scrapping and shallow weeding to minimize soil disturbance. Dr. Waswa advised the cluster leaders to ensure that when farmers carry out crop thinning (fig 13), manual weeding, they should do it carefully to maintain the technologies, i.e., rip lines, planting basins, and *Zai* pits (fig. 14). Since the CSA innovations were labour-intensive, proper maintenance during manual weeding was important to ensure the innovation had a long lifecycle.

Incidences of Fall Army Worm (FAW) infestation was noted in some fields. Farmers were trained on identification of the pest. Dr. Waswa advised the Cluster leaders and farmers to scout and regularly monitor for pest and diseases and control using appropriate measures (fig 14). Farmers were advised to use cultural and biological solutions where possible. Where chemical pesticides are used, farmers were advised to strictly follow instructions on the labels and wear personal protective equipment.

Other pests observed on the demonstration sites were squirrels attacking the young, germinated maize seeds. Controlling these squirrels using repellents was viable however, farmers were encouraged to plant earlier and at the same time to minimize attack.

Figure 12: Farmers inspecting a cluster leader plot with ripping

Figure 13: Thinning of a sorghum crop

Figure 14: Crop weeding in planting basins

Figure 15: Inspecting crop for possible fall armyworm attack

Capacity building before and after

The farmers reported having benefitted from diverse training and advisories from the trained CSA cluster leaders, the county extension officer and experts from AICCRA. The Cluster Leaders being based in the community are accessible and provided needed support to the farmers and regular feedback to the Cooperative. The mother demos in each cluster served as a shared school where the farmers regularly meet to learn and take lessons to their farms. The learning by doing was commended as it provided practical application of the lessons learnt. The regular visits by John Kathee, the County Ward Agricultural Officer (WAO) had reinforced the learning around CSA and reduced reliance on far off support from the AICCRA project staff. The WAO is instrumental in supporting these farmers in implementing the CSA innovations in their demonstration sites through technical support. The officer has been able to help farmers to adhere to the protocol advising farmers on agronomic practices. Some advice given includes land preparation, planting time, when to do weeding, and how to manage their crops up to maturity. He also advises farmers on other general agronomic practices, such as when to apply top dressing, pest control, and general crop management. The WAO also goes around to check on the progress of these demonstration sites.

Farmer perceptions about the CSA technologies

The farmers reported benefits of using the various CSA technologies. The planting basins and the *Zai* pits helped in water conservation. Mixing topsoil with organic manure and crop stovers concentrated nutrients in the planting holes and contributed to improved soil organic matter. This enabled farmers with littler manure to use it efficiently. Plants grown in the basins and pits showed better vigour compared to those planted on flat beds. In addition, there is increased soil conservation when using these technologies as they reduce water runoff that causes soil erosion.

This using ripping by tractor noted that it helped to trap water necessary for crop production; even with little rain, the crop can still grow to maturity and produce yield. Ripping

helps break the hardpan, unlike using animal draft power. The ripping helps water percolate deeply, reducing surface runoff and soil erosion and helping in water management – increasing water availability for the crop longer than using the animal draft.

In addition, if rain is not available for the whole season, planting basins, *Zai* pits, and ripping crops will be tolerant as their deep roots could access more groundwater than the shallow roots under normal planting conditions.

A visit to the homesteads showed that most farmers had embraced other diversified enterprises, such as livestock production (rearing of cows, chickens, chicks, goats, and sheep) that were a source of organic manure and income that enhanced adoption of CSA innovations. Diversification is also a strategy for building resilience to climate change in dryland areas.

Farmers noted that zai pits and basins were labour intensive, and expensive to implement. This is more so considering that majority of the farmers are elderly women. Some farmers opted to dig the basins over time during the dry season before the rains commenced. Thise who opted to hire labour paid at Ksh. 30-60 to dig one basin.

Some farmers scaled down CSA adoption or opted to fall back to their traditional practices due lack of resources to dig the basins, pay for the ripping services or the unavailability of the tractor ripping services when they needed it.

Reflection/Feedback on CSA Learning

A joint meeting was held with the Kimatwa Women SACCO to get feedback on implementing the CSA scaling demonstrations. This meeting was attended by the CSA Cluster Leaders, the Alliance AICCRA team, and the WAO. The meeting was chaired by Theresiah Ngonze, the SACCO Chairlady.

The meeting aimed to gather insights from cluster leaders about their experiences implementing the activities, challenges and identify opportunities for better support and delivery. Theresiah Ngonze briefly explained the model used for CSA learning. She explained how the structure of the Cooperative operates and makes decisions. She highlighted some of the conditions to be met before the farmer benefits from the revolving scheme for the seed – the farmer must be a member of the Cooperative and make an effort to adopt any of the CSA land preparation practices, either ripping, *Zai* pits or planting basins. And the farmer should agree to return five kilograms of seed for a kilo they took.

Each cluster leader got an opportunity to share the progress, opportunities, challenges, and recommendations for future interventions. The AICCRA team also complimented the cluster leaders for their good work in implementing these CSA innovations in the farms, enhancing farmer-to-farmer learning that has enhanced the scaling of these innovations. Dr Boaz also informed on the next steps regarding crop nutrition and management, including early weeding, pest control, application of top dressing – vegetative (foliar) and basal fertilizers, and maintenance of land-based CSA innovations. The AICCRA project committed to providing a limited amount of inputs, particularly for crop nutrition and management for the mother demos.

Achievements

The participants reported on the following achievements and opportunities

1. All the clusters developed nine demonstration sites for their farmers to learn. In addition, some clusters developed more than one demo site to cater to farmers from distant areas.
2. Working as a cooperative has also been a strong point for the Kimatwa Women SACCO, the members have been able to pool resources to implement the CSA innovations.
3. The members have benefited through access to improved certified seeds implemented in their demos through the cooperative.
4. There is increased demand for the Cooperative services, such as tractor-ripping services. Through the incentive, they have been able to rip many acres, increasing the size of land under ripping, enhancing CSA, and increasing income for the cooperative.
5. Through farmer-to-farmer learning, farmers who are non-members of Kimatwa Women SACCO have also been encouraged to adopt these CSA innovations.
6. Ripping by a tractor has enhanced water harvesting and prolonged water storage in the soil.
7. Through the cooperative approach, there has been observed scaling of these CSA innovations – more farmers have practiced *Zai* pits, planting basins and ripping.
8. The Kimatwa SACCO has been able to obtain the tractor that they use for services and for hire.
9. Opening up other learning centers where other farmers get to learn these CSA innovations.

Challenges

1. Unexpected high rainfall patterns, that led to chlorosis of the crops, especially in the planting basins and *Zai* pits. Although these CSA innovations are meant for ASALs, unexpected heavy rains countered the benefits of these technologies. The planting basins and *Zai* pits collected a lot of water, leading to nutrient leaching.
2. There was poor germination of seeds in some demonstration sites, particularly in areas where they had been planted earlier. Some of the seeds decayed after sowing, while others withered due to a lack of rainfall in the subsequent period.
3. Increased pest attacks, such as cutworms and fall armyworms, squirrels and livestock, destroyed some demonstration site technologies, such as maize crops. Replanted seeds were susceptible to attacks by squirrels, leading to further losses to the farmers.
4. Although the planting basins and *Zai* pits can be used for more than one season, these technologies are labor-intensive during the initial installation stage. Most farmers in the group, being elderly women, had difficulties developing these innovations. Some developed the technologies themselves, whereas some hired labour which was expensive. Drudgery discouraged the development of more *Zai* pits and planting basins.
5. Some farmers hesitated to adopt ripping technology and chose to stick with ox ploughs instead.
6. There was high demand for tractor services, especially during the peak season during planting; hence, some farmers missed the opportunity for its services.
7. Lack of skilled labour to develop the planting basins and *Zai* pits. In some cases, the labourers did not adhere to the protocol– mixed the topsoil and the subsoil, which was not the case, no proper design for the Zai pits etc. Hence, the exercise required a lot of supervision.

8. Increased weed attacks on some demonstration sites, and the organic manure was so deep, particularly in the case of tractor ripping.
9. The Cluster Leaders provide additional support to their groups. This requires regular visits, calling and reporting back to the Cooperative. This can be draining.

Recommendations

Regular monitoring of the demos is critical for successful implementation. The visits and technical support will be enhanced by linking with the County extension officer and the trained cluster leaders. In collaboration with the Cooperative, the project, will explore models for affordable and timely access to the labour and mechanization around CSA. The Cooperative is designing the agricultural loan to address the issues of access to CSA varieties and mechanization. The project to explore a model of facilitation of the Cluster leaders to ensure effective support. The project will facilitate more training and backstopping visits to enhance learning, leading to the adoption and retention of the technologies picked by the farmers.

Way forward

The visit presented first insights on the journey to scaling CSA with women farmer cooperative in Makindu. The learning and uptake is impressive. The visit identified various social technical issues that need to be addressed for the initiative to be a success. The diversity of the farmers calls for provision of options to choose from. Success in implementing these demonstration sites is also attributed to the collaboration with the Makueni County Agriculture Department through the Makindu Ward Agricultural Office. Building more on the co-design learning approach can significantly increase the adoption and scaling of CSA innovations. Other farmers, too, have been encouraged to implement these innovations after learning from the demo sites that were implemented by the Kimatwa Women SACCO. Thus, maximizing the co-design approach, taking care of mother demonstration, increasing capacity building, farmer-to-farmer learning, and extension services are important in enabling farmers to increase the adoption and scaling up of these CSA innovations.

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