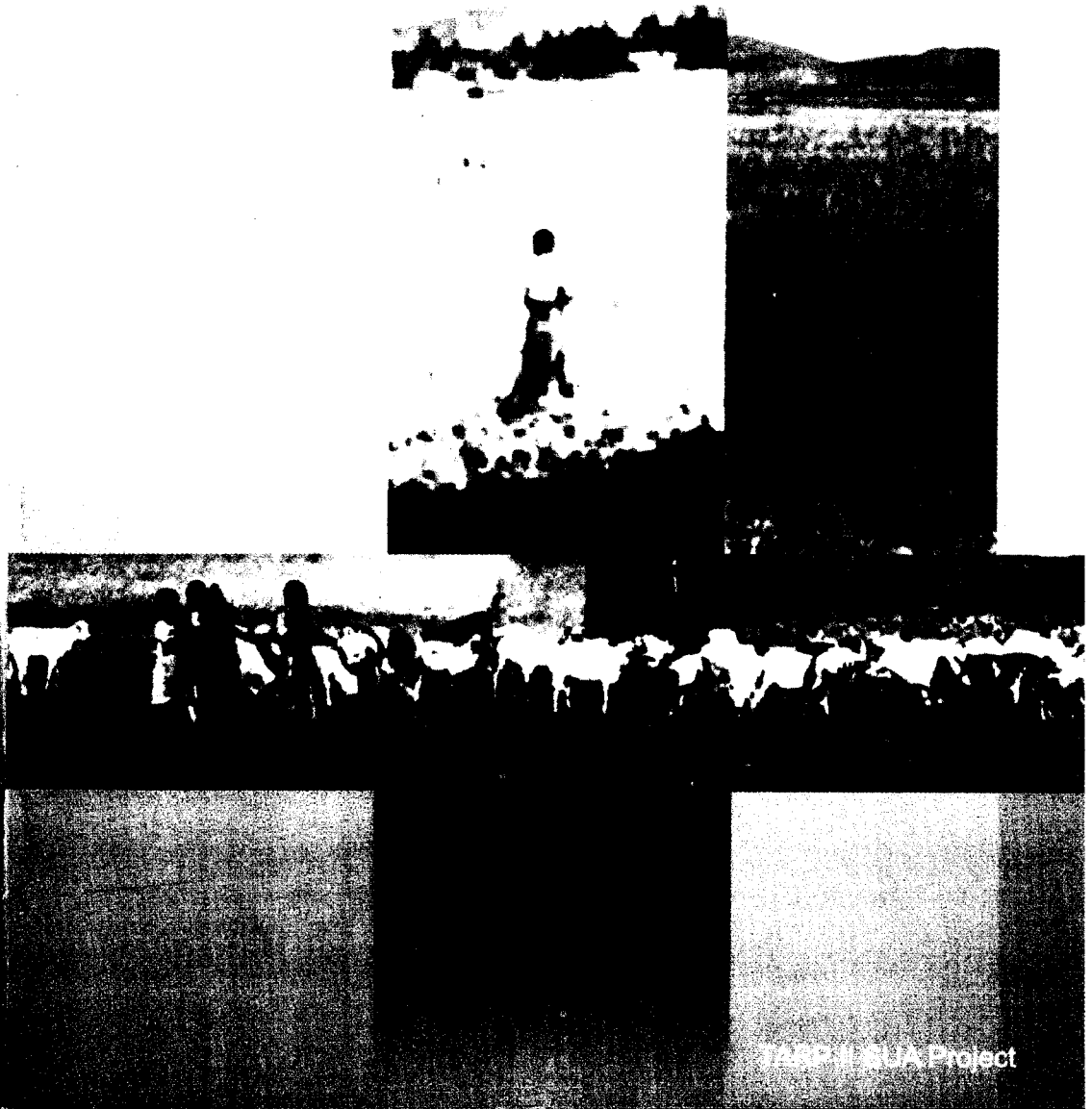


# efficient utilisation of *river valleys* experiences from mbarali



TRIP II SJA Project

**EFFICIENT UTILIZATION OF  
RIVER VALLEYS  
Lessons from Mbarali**

*The visit was organised by the*

*Implementation Team of the Project*

**Food Security and Household Income for Smallholder Farmers in Tanzania:  
Applied Research with Emphasis on Women**

**under the Tanzania Agricultural research Project, Phase Two  
(TARP II – SUA Project)**

**August 2002**

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## **Table of contents**

<b>Preface</b>	<b>v</b>
<b>Acronyms</b>	<b>vii</b>
<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Basis for selection of sites</b>	<b>2</b>
<b>3.0 Case Studies</b>	<b>4</b>
<b>3.1 Rice seed production</b>	<b>4</b>
<b>3.2 Sustainable utilization of water resources</b>	<b>7</b>
<b>3.3 Soil fertility and land management practices</b>	<b>9</b>
<b>3.4 Alternative cash crops</b>	<b>9</b>
<b>3.5 Other activities in Usangu Plains</b>	<b>11</b>
<b>4.0 Lessons learnt</b>	<b>14</b>
<b>5.0 Follow-up activities by farmers</b>	<b>15</b>

## **Preface**

Sokoine University of Agriculture (SUA) in collaboration with the Ministry of Agriculture and Food Security (MAFS) and the Agricultural University of Norway (NLH) is implementing a research project on Food Security and Household Income for Smallholder Farmers in Tanzania.

Strengthening Farmer-Research-Extension linkage is among the key components of this Project. To meet the objectives of this component, farmer exchange visits are planned and conducted in each zone. These are initiated and facilitated by the project and are carried out twice a year in each zone.

This publication constitutes a report from a farmer exchange visit in which farmers from Kyela district visited farmers in various villages in Mbarali district. The visit was aimed at exposing the visiting farmers to various income earning and food producing activities in the Usangu plains. The report is also available in Kiswahili language.

*Prof. L. D. B. Kinabo*  
*Project Coordinator*  
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*August 2002*

## **Abbreviations and Acronyms**

<b>SUA</b>	<b>Sokoine University of Agriculture</b>
<b>TARP II</b>	<b>Tanzania Agricultural Research Project Phase Two</b>
<b>MAFS</b>	<b>Ministry of Agriculture and Food Security</b>
<b>NLH</b>	<b>Agricultural University of Norway</b>

## **1.0 Introduction**

To maintain an effective linkage mechanism involving farmers, researchers and extension agents, which has been achieved through the TARP II – SUA Project, farmer exchange visits within and between zones have continued to be carried out.

In the Southern Highlands zones, within zone exchange visit was carried out from April 14 to 19, 2002. In this visit, farmers, extension agents and researchers from Kyela rice growing areas visited their counterparts in the Usangu plains to exchange experiences in rice cultivation and other agricultural enterprises being carried during the year. The theme of the visit was “Efficient Utilization of River valleys”, a concept aimed at improving awareness of rice producing farmers in land and water management, including cropping systems and their interaction with livestock production systems.

It is well understood that land and water are necessary resources for agricultural production. These essential resources have often led to wars between tribes within a country or between countries. Rarely do water and agricultural land are efficiently utilized in agricultural production in most developing countries. The two resources often occur concurrently in valley bottoms for the major part of the year. Thus, valley bottoms offer a unique environment guaranteeing profitable agricultural production if sustainably managed. There are many examples to support the above contention. Firstly, it is worthy noting that modern civilization started in valley

bottoms of the Persian Gulf and Egypt. Secondly, Valley bottoms in China, USA and USSR as well as in many other countries have been breadbaskets supporting the respective countries.

In Tanzania, valley bottoms are found in various parts and have proved to be a formidable force in boosting agricultural production. Valleys such as the Kilombero river basin, the Usangu plains, the Rufiji river basin and many others have tremendous potential for increased agricultural production, particularly rice and other water-loving crops. These valleys have and will continue to contribute significantly to the food security and household incomes of many Tanzanians. A clear understanding of the management requirements for these valleys will greatly contribute to increased food production in the country. One way of extending the knowledge to disadvantaged farmer groups is to facilitate farmer exchange visits to allow for free technological exchanges among them.

## **2.0 Basis for selection of sites**

Kyela rice farmers were selected following observations made by the Monitoring and Evaluation Team of TARP II SUA Project during their visit to the district. The Team observed that whereas Kyela was producing highest quality rice in the country, the agronomic practices were pathetic and productivity was below  $1,750 \text{ kg ha}^{-1}$ . This is in comparison to over  $35,000 \text{ kg ha}^{-1}$  harvested in the Usangu Plains. The high yields realized by these farmers



were found to be associated with good agronomic practices coupled with availability of irrigation facilities. The irrigation facilities are mostly improved traditional canals.

In view of this, it was considered that Kyela farmers would benefit from these and other technological advancements in Mbarali district. In addition, Kyela was considered the best place from which visiting farmers had to come from for the following reasons:

- The entire district constitutes an expanded valley bottom suitable for modern crop and livestock production.
- Currently, Kyela valley is grossly under-utilized and most farmers practice unsustainable agricultural production systems.
- Rice production in Kyela is dependent on rainfall although it could benefit much from sustainable production practices such as irrigation and rainwater harvesting.
- While Kyela is suitable for growing cashew nuts and cocoa as cash crops, the two have not received the attention they deserve. These crops are generally neglected.
- Consumers within the country and abroad cherish Rice produced in Kyela because of its unique aroma. Unfortunately, rice is produced in quantities not commensurate with the demand; consequently returns from rice production are meagre.

Thus, twelve farmers (of which six were women) from Kyela visited Mbarali district with the primary aim of learning from their counterparts on sustainable utilization of valley bottoms. The main objective was for the farmers to acquire knowledge and skills in rice nursery preparation, land preparation for rice production, planting techniques and traditional irrigated rice production systems through the exchange and sharing of information with their counterparts in the Usangu plains. Furthermore, the visiting farmers were exposed to traditional large-scale animal husbandry, soil fertility and conservation practises, alternative cash crops and benefits of farmer's groups in managing agriculture and/livestock enterprises.

### **3.0 Case studies**

#### **3.1 Rice seed production**

Successful rice production begins with the utilization of clean but high quality seeds. In the Usangu plains this prerequisite for profitable rice production has long been realised. A shining example was seen in the Igomelo area of the Usangu plains where clean high quality seeds are produced by selected farmers. The seeds produced are then distributed to all the other farmers in the area at a small cost. The beneficiaries from the above arrangement, however, are mostly members of farmers groups. Farmers entrusted with the task of producing seeds are those who have already been trained and are skilled in modern rice production, including seed production. The production of quality seeds starts with raising seedlings in nursery,

which are later transplanted in the production plot. Seedlings should be raised at least one month before transplantation.

***Preparation of seedlings bed for rice***

- Prepare rice seeds of preferred variety. Normally 36 kg are sufficient for producing seedling enough for a one-hectare farm.
- Soak the seeds in water for 24 hours to remove floating seeds. Seeds that settle at the bottom of container are suitable for sowing in the nursery bed.
- Spread the clean seeds on a mat and cover to allow for germination. Malt should be formed within forty-eight hours (2 days).
- In the meantime, prepare a seedbed and allow water to enter so that it becomes muddy.
- Sow the germinated seeds in the nursery beds by broadcasting or dibbling.
- Gently puddle the seedbed so as to submerge the seeds in the wet soil.
- Leave the seedbed undisturbed for 3 days. During this period do not allow any more water into the seedbed.
- After three days, allow more water into the seedbed. Seedlings are usually ready for transplanting after three weeks.

***Steps followed in establishing a rice seed production plot***

- Decide on the size of the plot on which seed production will be undertaken

- Plough the selected area by tractor, power tiller or animal drawn implements
- Make boundary bunds around the prepared plot to allow water to stand when required.
- Divide the plot into subplots surrounded by bunds; preferably 8 subplots per acre.
- Properly level the plots so as to allow for easy water management
- Allow water to enter subplots until they are flooded
- Rest the subplots in this state for time ranging from 2- 4 weeks in order to allow thorough wetting of the soil.
- Prepare three to four ropes (preferably nylon) each with a length sufficient to cover the subplot in length and breadth. Mark the ropes with several knots, 20 cm apart.
- Guided by the pre-marked nylon ropes transplant the seedlings into the subplots so that the individual seedlings are 20 cm apart. In other words the distance from one row of seedlings to another will be 20 cm as will be the distance from one seedling to another. Plant 2 seedlings per hole.
- Apply fertilizer two weeks after transplanting. Ensure regular weeding of the plots and you may top-dress again with nitrogen fertilizer at recommended rates towards flowering.

Experience from Igomelo shows that seed production plots prepared and managed as detailed above guarantee a bumper harvest of up to 30 bags of rice seeds per acre. In

view of that, commercial rice seed production is becoming popular among farmers in Igomeko.

Land preparation and planting on ordinary rice farms follows the same procedure as outlined above. As is the case for seed production, farmers in the Usangu plains are able to harvest up to forty bags of rice per acre. The key factor in this success story is proper utilization of meagre resources, mainly land and water, coupled with the use of recommended agronomic practices. Visiting farmers appreciated the potential of River valleys in revolutionizing agricultural production. They observed that Kyela was a sleeping giant and thus promised to reverse the current state of affairs in their home district upon return.

### **3.2 Sustainable utilization of water resource**

Successful agricultural production hinges upon efficient and sustainable resources utilization. Furthermore, availability of water in quantities enough to sustain crops and livestock all year round is a pre-requisite towards ensuring high agricultural productivity. Gone are the days when agriculture was dependent on rainfall, especially now that the adverse effects of human activity on the environment are being felt at the highest level in the history of mankind. Techniques that are used to harness and utilize water in agricultural production have been found to act as an engine in the agricultural production chain.

Most of Mbarali district is semi-arid except for few areas that are close to Ihefu flood plains and those serviced by rivers, e.g. Chimala and others. For Mbarali therefore, water is a valuable resource whose proper use is the only way to guarantee the survival of its people and their livestock. Many communities in the Usangu plains in Mbarali district practise water harnessing and management technologies. There are a number of irrigation schemes most of which are managed by farmer groups. Such schemes are found in Igomelo, Madibira, Ubaruku and Igurusi. In all the smallholder irrigation schemes, registered farmer groups are the managers of the canals as well as the water catchments. Thus the maintenance of irrigation channels and canals and the rationing of water to individual users are done by members of the groups.

It was noted that the farmers groups had an obligation of paying water bills to the central government and ensuring that surplus water is returned to the river in order to minimize wastage. In all cases experts in agriculture and those in Irrigation and water management are always at hand to advise farmers as and when need arises. Farmers, on self-help arrangements, initiated all these irrigation schemes. The government later supported these initiatives. Government assistance focused on farmers groups that had been formally registered, thus qualifying for such assistance.

At the time of our visit to the Usangu plains, it was reported that because of availability of water throughout the year and its sustainable utilization, rice is planted twice a year, off-season vegetable production is commonplace

and planning of agricultural activities is possible, since vagaries of weather no longer affect them. The visitors were therefore, urged to emulate them so as to tap the resources abound in Kyela.

### **3.3 Soil fertility and land management practices**

While in Igomelo, the visitors were also shown soil fertility improvement trials managed jointly by farmers and agricultural experts from the District Executive Director's office. In the trial, *Mucuna* beans, a leguminous plant, were intercropped with maize in order to exploit its potential in soil enrichment. In another trial in Chimala, Soybeans are being used to enrich the soil before other crops are planted. Obviously these trials will, in the long run, make a difference in the farming community.

### **3.4 Alternative cash crops**

Mbarali district, as is the case for Kyela district, does not have recognized cash crops. Rice although predominantly a food crop, also doubles as a source of income and is consequently considered a cash crop. Over dependency on rice have had undesirable consequences especially now with the advent of trade liberalization. As a coping strategy, Mbarali district's Department of Agriculture has introduced trees of *Moringa spp* and cashew nuts in the farming systems of communities in the district.

## **The *Moringa* tree**

### **Uses of *Moringa***

*Moringa* tree is a potential future cash crop for Mbarali district given its numerous benefits. From the *Moringa* fruit one could extract cooking oil, cosmetic oil as well as oils used as lubricants for machines. Following extraction of oil the remaining *moringa* cake is a rich source of plant protein and can be used for compounding livestock feeds. *Moringa* seeds can also be used as water purifier in the place of chlorine-based preparations. *Moringa* leaves can be ground and used as human food and can also be used for producing chemotherapeutic agent for managing diabetes and heart diseases. In addition *moringa* tree is a soil enrichment plant. All the itemised qualities of *moringa* would guarantee a farmer the much-needed income.

### ***Moringa* planting**

The following are the cultural requirements of *Moringa* as was explained by Mr. Lucas Mlowe of Chimala village in the Usangu plains:

- Prepare the plot on which *Moringa* will be planted by ploughing followed up by harrowing.
- Dig pits with a depth of 60 cm and 60 cm width (2 x 2 ft). The space between pits should be 2.5 m.
- Pour in each pit one-10 liter bucketful of cow dung (farm yard manure (FYM)) or other types of organic manures.
- Thoroughly mix the manure with top soil from the same hole
- Plant one *Moringa* seed per hole.



- Water the plot every other day if planted off season
- Regular weeding is necessary

### **Cashew nut trees**

Trials on cashew nut trees are in progress in various parts of the Usangu plains. During the visit, we saw trials at Madibira Secondary School and at Mr. Lucas Mlowe's farm in Chimala village. The trials were showing promising results even at this early stage. Observations are based on two planting materials – clones and seeds. The objective of these trials is to find out the best planting material for the Usangu plains. It appears cashew nut trees will perform well in Mbarali and we believe in Kyela too. Some visiting farmers promised that upon their return home they would establish cashew nut plots.

### **3.5 Other activities in Usangu plains**

#### ***Ubaruku Dairy Cattle Keepers Association***

In Ubaruku village the visiting farmers met members of Dairy Cattle Keepers Association. Members of the association have been trained on small-scale dairy cattle management. The association, which is called "*Kwang'omaru*" was officially registered in 1999 and has democratically elected its leadership. Each member of the group keeps own dairy cattle. Milk is collected and marketed centrally and also the essential quality control inputs are procured jointly. It was clearly apparent that members were enjoying the fruits of their being in the association.

A member pays Tshs 2,500/= as membership fee. He or she may also buy up to 5 shares each worthy Tshs 5,000/=. This is the money used for buying containers and cooling facilities for the group, including payment for rented business premises. Later the group changed from farmer group to Cooperative Union and has now democratically elected their leaders. It has a council, which is also elected by the members of the Union. A Sales Committee is in charge of the milk sales. This Union was register in 2001 with registration No. 480.

The Union has had several benefits to the members, including provision of reliable market for the milk and control of milk quality, which has ensured availability of customers at a regular basis. Despite those successes, the Union is facing some problems related to low capital for procuring more dairy cattle, lack of cattle dips has resulted in many cattle dying from tick-borne diseases, lack of drugs for treating sick animals (when available, they are too expensive). They also sited taxation as another problem retarding their business. Currently the Union pays Tshs 100,000/ per annum and stump duty of 25,000/=

#### ***Ikoga Traditional Cattle Keepers Association***

At Ikoga village the visiting farmers met members of the Traditional Cattle Keepers Association. The association whose name is UWAMI started in 2001 after its current chairperson, one Daudi Muli came back from Songea where he had attended a Southern Highlands Farmers Forum organised by TARP II SUA Project. At the forum,

whose theme was "Improvement of relations between crop farmers and livestock keepers, Muli recalls that, he was impressed to hear that formation of farmers groups was a way towards resolving conflicts and that farmers could use their association to solve many other problems which interfere with their performance. Thus upon arrival at Ikoga he sensitised fellow livestock keepers to form an association. The association has 25 households who are considered active members. Only male members of the households are genuine members. Generally, females do not participate in any activities of the association. The objectives of UWAMI are to collectively:

- Identify and solve problems that interfere with livestock productivity
- Solicit assistance from higher authorities on matters such as education, farm and livestock inputs and markets for crop and livestock products
- Hold forums for electing representatives at various organs/meetings
- Strengthen security as a means for curbing livestock theft.

The members have a total of 7,674 herds of cattle, 894 goats, 836 sheep, and 70 donkeys. Each member has contributed Tshs 2000/= as membership fee and Tshs 10,000/= as share, all these amounting to Tshs 250,000/= with which they opened a joint Bank Account.

The association was however, facing a number of problems including cattle diseases mainly Contagious Bovine Pleuropneumonia, shortage of water for domestic use and for livestock, inadequate grazing area,

unavailability of drugs for livestock and lack of cattle dips. It was noted that members have not yet started cooperating in the collection and marketing of their produce, i.e. milk, meat and live animals. They were advised by the visiting farmers to reduce livestock numbers, practice improved livestock keeping techniques and to use properly managed farmyard manure. By-laws could be used in ensuring successful implementation of development tasks.

#### **4.0 Lessons learnt**

At the end of the visit, the visitors appeared satisfied and acknowledged to have learnt the following:

- Management of water in rice fields
- Proper planting of rice such as transplanting of rice seedlings is superior to broadcasting
- Skills in nursery bed preparation are vital in increasing productivity
- Farmer groups are important in assisting farmers to solve the problem of unreliable market channels for crop and livestock products
- Proper use of rice husks can considerably reduce weeding frequency
- If farmers seek and use expert knowledge, they can improve productivity and income significantly.
- Smallholder irrigation practices
- Skills of using power tillers in land preparation
- Water is an important resource, thus if properly managed it can revolutionize agriculture.

## 5.0 Follow-up activities by farmers

The visiting farmers promised to undertake the following activities after returning home (Table 1):

**Table 1: Follow up activities by farmers from Kyela**

S.No	Name	Gender	Village	Ward	Postal Address	Follow-up activity
1.	Frida Mwanpiki	F	Mababu	Matema	P. O. Box 357 Kyela	<ul style="list-style-type: none"><li>• Planting rice in recommended way (Transplant using ropes rather than broadcast seeds)</li><li>• Plant beans and maize and use organic fertilizer (cow dung)</li></ul>
2.	Andrew Mwasulama	M	Nyelee	Bujonde	P. O. Box 210 Kyela	<ul style="list-style-type: none"><li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li><li>• I will prepare a rice demonstration plot</li></ul>
3.	Joseph Mwambinga	M	Lugombo	Ngonga	P. O. Box 80 Kyela	<ul style="list-style-type: none"><li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li><li>• My rice farm will be subdivided into sub-plots (Majaluba)</li></ul>

4.	Asegelisye Mwaseba	M	Kilasilo	Ikolo	C/o P. O. Box 231 Kyela	<ul style="list-style-type: none"> <li>• I will plant rice per recommended spacing rather than broadcast</li> <li>• I will start applying rice husks as organic mulch on rice fields</li> <li>• I will sensitise my neighbours/friends to form a rice farmer's group</li> </ul>
5.	Gaspar Njerekela	M	Kyela Urban	Kyela Urban	P. O. Box 170 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> <li>• I will establish a Moringa plantation</li> </ul>
6.	Anold Keneth	M	Lugombo	Mwaya	P. O. Box 285 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> </ul>
7.	Martin Mwangomo	M	Kisale	Ipinda	P. O. Box 145 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> <li>• I will establish a Moringa plantation</li> <li>• Planting and taking care of maize and beans as per experts recommendation</li> </ul>
8.	Veronica Ambike	F	Lukwego	Lusungu	P. O. Box 95 Kyela	<ul style="list-style-type: none"> <li>• Start a demonstration plot on recommended planting and care of rice fields</li> <li>• Start planting improved bean seeds for higher production</li> </ul>

						<ul style="list-style-type: none"> <li>• Use rice husks as organic mulch on rice and beans fields</li> </ul>
9.	Nisile Mwangole	F	Bondoni	Kyela Urban	P. O. Box 148 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> </ul>
10.	Tutindaga Lukuta	F	Lugombo	Ngonga	P. O. Box 80 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> <li>• Planting and taking care of maize and beans as per experts recommendation</li> <li>• Start small scale dairy farming</li> </ul>
11.	Air Kyoma	F	Kilasilo	Kilasilo	P. O. Box 231 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> </ul>
12.	Hilda Kiila	F	Itope	Bujonde	P. O. Box 304 Kyela	<ul style="list-style-type: none"> <li>• Prepare rice nursery and transplant rice, spacing plants 20 cm by 20 cm as recommended by experts</li> </ul>