

# FORAGE DEMONSTRATION REPORT IN KILIMANJARO AND TANGA REGIONS, TANZANIA

2021

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## **(A) Introduction**

The International Center for Tropical Agriculture (CIAT) implemented Irrigated forage production and environmental interventions in Kilimanjaro and Tanga Regions of Tanzania. Four Districts (Siha, Hai in Kilimanjaro, Muheza and Mkinga in Tanga) were the main activity sites located for establishment of improved irrigated forage demo plots, where *Brachiaria* hybrid cv Cobra variety and *Brachiaria* hybrid cv Cayman varieties were introduced in the demo plots.

In this work we met two different groups of service providers in the livestock sector in these two Regions.

### **Kilimanjaro Region (Siha and Hai District):**

In this Region we worked with Community Youth Dairy Producers (JUVIMATA) platform which have the following members in platform:-

1. Forage producers (there 6 groups of this category which makes a total 120 members); this group produce and sell Maize silage, Hay and some are involved in selling concentrates.
2. Milk vendors (Milk collectors and seller)
3. Youth groups that are involved in selling milk through milk ATM.
4. Youth groups that are involved in delivering Artificial Insemination Services (AI).
5. Youth groups Skilled on vet services.

The total number that makes JUVIMATA platform is 450 and the number of youth agripreneurs trained and participated in the demo plot establishment were 50, selected based on their willingness to learn and offer their time, energy and skills in forage production and be able to train other youth members in the community.

### **Tanga Region (Muheza and Mkinga District):**

In Tanga Region we were privileged to work with primary associations of dairy producers and retailers known as UWAMKI of Mkuzi and Mindu in Muheza District and UWADAKI of Daluni in Mkinga District.

**UWAMKI (Mkuzi and Mindu villages) – Muheza;**

The association have a total number of 110, these are active members of the association. Currently, 86 members are delivering milk to the available milk collection center located at Mkuzi village. The highest/maximum liters of milk collection per day is 1200 and minimum collection is 500 liters per day. Currently the amount of milk collected is 850 lts per day.

#### **UWADAKI (Daluni village) – Mkinga;**

The association have a total number of 106, these are active members of the association. Currently, 90 members are delivering milk to the available milk collection center located at Daluni village. The highest/maximum liters of milk collection per day is 2000 and minimum collection is 750 liters per day. Currently the amount of milk collected is 850 liters per day.

About 68 livestock keepers (25 active members from each village belong in the primary association) were selected to participate in the training and forage demo plot establishment. The criteria for selecting farmers were:-

- Farmers selected were those who do well in dairy production
- And those who follow the rules of dairy production,
- As well as have the willingness to participate in demo plot establishment and monitoring the established plots.
- Also, those who are willing to teach other farmers on these important techniques for producing good quality feed for dairy cows.

#### **The Objective of the activity**

- Provide education on the production of improved quality dairy cattle forages (*Brachiaria* hybrid cv Cobra variety and *Brachiaria* hybrid cv Cayman) through irrigation (local irrigation).
- Enabling groups involved in the provision of livestock services particularly the pastures and forage to produce and distribute quality improved seeds to other livestock keepers to enhance dairy milk production.
- Provide training on the importance of growing improved forage for environmental conservation, soil fertilization through forage plants and prevention of environmental impacts caused by feeding of poor animal feeds that leads to production of harmful gases (Methane gas – CH<sub>4</sub>).

#### **Methodology:**

##### **Primary work;**

- Building up a base of local contacts, contact details of Youth Agripreneurs group in Siha and Hai District in Kilimanjaro, and Primary Dairy keeper Associations in Muheza and Mkinga Districts in Tanga.
- Understand the sites that were located for demo plot establishment; this included knowing the number of training participants (farmers), availability of training venue that

provided enough space to accommodate farmers during training while adhering to safety measures regarding the current situation of COVID-19.

- Introducing the objective of the field activity and the training as well as discussing with farmers the best method and their participation for making sure that the demo plots are well managed to achieve the goal of the activity. The work of the demo plot establishment began by training people identified from groups of 25 people (in two phases in size of 12 and 13 people) to protect themselves from COVID-19.

### Process;

The training was aimed at educating the beneficiaries (Youth Agripreneurs group and Primary Dairy Farmers Associations in the following key areas:-

- The importance of growing improved forages for dairy cows.
- Best practices for forage production, management and harvesting processes.
- The context of environmental and soil conservation by planting improved forages.

All Regions, Districts and villages that were proposed by SNV and Solidaridad were visited and the forage field work (training and demo plot establishment) were successful performed as planned.

### Results

**Kilimanjaro:** The work began in Kilimanjaro Region, in Siha and Hai District for Training Youth Agripreneurs group on the importance of planting and establish demo plots for the best improved forages (*Brachiaria* Cobra and Cayman) varieties.



Plate 1: Training for Youth Agripreneurs Group in Siha District

The response of the Youth Agripreneurs group in Siha who were recommended to participate in the training was very positive (See Table 1). The Youth were pleased to see that SNV, CIAT and ILRI have a good plan to lift the young people out of poverty by developing them in their careers, and further uplift the dairy industry by facilitating access to quality forages based on environmental and soil improvement, and as well as facilitating access of quantity and quality milk thus boosting the economy of the small scale household dairy keepers.

**Table 2:** The number of participants attended the training and demo plot establishment practices in Kilimanjaro and Tanga Regions.

Region Districts (Siha and Hai)		Region Districts (Muheza and Mkinga)	
Participants		Participants	
M	F	M	F
26	19	46	22
Total Number :		Total Number:	
45		68	

The participation of youth females was slightly lower compared to that of males. This was attributed to the fact that many young men were invited to get involved in livestock matters for the search of employment and many young men were exposed in cultivating and producing maize silage. This encouraged many young men to be involved in activities related to forage production and selling compared to young women.

### Area located for forage demo plot establishment

To accomplish this forage demo establishment activity, it was proposed to the Youth Agripreneurs group to locate/offer an area land with a size ranging from half (1/2) acre and 1 acre 1. The area had to be good access to water to facilitate the irrigation of forages in dry season and enable good harvest of forage throughout the year due to availability of water and good management of the plot.

The group accepted the idea and offered ½ an acre for introducing irrigated improved *Brachiaria* cv Cobra and Cayman in Siha District. Formerly, the area was grown Maize for making silage, and through the training conducted, the youth realized the benefits of growing improved forage to increase their yields and income because they were determined to follow the best farming practices that were directed so that they could achieve high forage biomass produce.

### Plot layout

The plot sizes used was 6m x 6m with 1m between plots, distance between plants to plant was 45cm x 30cm. I we managed to have twelve replicates six for Cobra and another six for Cayman. The other space was used for raising seedbed. And seed per hole were 12 seeds each.

#### **Mode of irrigation:**

The main irrigation system to be used in the area is surface water irrigation. The area has reliable source of water for irrigation and they can irrigate all the time when moisture is needed in the forage demo plots.

#### **Other alternative made to ensure availability of improved forage seeds**

Siha and Hai is privileged to be near a Tanzania Livestock Research Institute (TALIRI) center of West Kilimanjaro. We visited TALIRI and introduced the activity that we were performing at the area and called upon their participation on demo plot establishment, and agreed that they establish seedbeds at their center that will be used as back up to our farmers and to help the institute to establish Brachiaria plots at their area. One kg (500g Cobra and 500g Cayman) seed varieties was given for the agreed work.

It was observed that some of the Youth group members had their family members' land that are used for growing forage. And by the time we were conducting the training the land was grown on maize for silage. They showed interest and commitment to grow Brachiaria in their areas; we agreed with them to raise seedbeds for the improved forage and 1Kg (500g Cobra and 500g Cayman) was given to them to perpetuate improved irrigated forages in their lands.

#### **Challenge encountered during field work in Siha and Hai**

We encountered a challenge in Kilimanjaro that slowed down our pace, however, this was taken like a catalyst to make more focused on the activity and understand. The challenge was:-

- Getting the Brachiaria seeds: The seeds were stack in Dar es Salaam, The agent assured us the seed would be in Arusha two weeks before, but it was not so. We had track down the seeds in Dar es Salaam Airport and we found that they had failed to understand who was the owner of the seeds, TALIRI or CIAT and needed a letter of collaboration between TALIRI and CIAT which was processed and posted to the authority (Tanzania Revenue Authority and the Ministry of Agriculture).

#### **Tanga Region:**

This was our second area after we accomplished the planned work in Kilimanjaro Region. The proposed Districts in the region was Muheza and Mkinga. Muheza is 37Km from Tanga town and Mkinga is 65Km away from Tanga, it is a rough road but well maintained, we used one

hour and a half to be at Daluni village where the farmers stay and installed the milk collection center.

### **Daluni village – Mkinga District**

The selected farmers selected represent other members of the dairy association were well prepared to receive the training on improved irrigated forage Brachiaria. Farmers were timely at the training venue and the involvement of women at this village was satisfactory compared to the other places. The main reason they came to learn is the challenge they face of not having enough feed which leads them to producing a liter of milk at a high cost, low productivity and so they have failed to realize the benefits of keeping dairy cows through the methods they use especially in accessing fodder and forages for feeding dairy cows in their area.

### **Area located for forage demo plot establishment**

They located a quarter an acre land for improved irrigated forage demo plot establishment. At the time of training farmers did not manage to locate more land for forage demo plot establishment. It was discussed and agreed to use the quarter an acre land as source of seeds for the other members of the association to get improved forage seeds.

### **Plot layout**

The plot sizes used was 5m x 4m with 1m between plots, distance between plants to plant was 45cm x 30cm. And we managed to have ten replicates five for Cobra and another five for Cayman. The other space was used for raising seedbed.



**Plate 2: Dairy farmers at Mkuzi village in Muheza conducting plot layout for planting Brachiaria**

### **Mode of irrigation:**

The main irrigation system to be used in the area is through water pump. There is a river near the demo plot, unfortunately it has a steep slope that does not support water to flow in the plot hence, and there is a need of applying water pumps to irrigate the demo plots. Farmers agreed on this and planned a way to ensure that the plots gets moisture all the time.

### **Challenges observed in Mkinga District**

It was observed that due to undulating land structures, it is not easy to apply tractor for cultivating the land. Cultivation is mainly done with hand hoe, this is tough work and it consumes a lot of time to prepare the field.

### **Muheza District**

In this District we were able to train a number of selected livestock keepers belong to the Primary Dairy Cow Association at Mkuzi and Mindu villages. The response of these livestock keepers to the training was very positive. Inadequate dairy cow feeds, low milk production, especially during the dry season, is a major problem facing dairy cow keepers, so this training on improved irrigated forage (Brachiaria) was a potential opportunity and a key step in solving the nutritional challenge for their dairy cows.



Plates 3, 4 and 5: Shows dairy farmers in Daluni village in Mkinga District watering the forage demo plot for planting Brachiaria

### **Area located for forage demo plot establishment**

Like in Mkinga District, most of the land in Muheza has steep slopes that does not facilitate natural water flow in fields. Due to potentiality of the knowledge equipped to the dairy keepers,

farmers discussed and were able to locate a quarter an acre land to be used for improved irrigated forage demo plot establishment. One of the farmers offered a shallow basin area that does not allow water logging to be used by the association as a forage demo plot. We visited the field and found the shallow well that were agreed to be used for irrigating forages especially to those places where moisture is low.

### **Plot layout**

The plot sizes used was 5m x 4m with 1m between plots, distance between plants to plant was 45cm x 30cm. We managed to have ten replicates five for Cobra and another five for Cayman. The other space was used for raising seedbed.

### **Mode of irrigation:**

The main irrigation system to be used in the area is through manual irrigation by using water cans. The area has reliable good shallow well that can be used as a source of water for irrigation and they can irrigate all the time where moisture is needed in the forage demo plots. And because the plots are at the basin, most of the time the soil is moist. And it does not require frequent watering of the plots.

### **Alternative way for raising seedbeds in Muheza district.**

Alternatively, farmers at Mindu village, located in an area which is fertile and moist most of the time were used to raise two good seedbeds used as back-up, and as a good source of seeds to farmers who stay far from Mkuzi village.

### **Challenges observed in Muheza District**

The challenges observed in Mkinga was no different from that of Muheza. The land in this district has slopes that does not easy mechanization like use of tractors to take place. Therefore, most of the work is done by using hand hoe, thus it is difficult for dairy keepers to make expansion of land as it needs huge capital to prepare the land.

### **Conclusion and Recommendation**

The training on improved forage production from *Brachiaria* cv Cobra and cv Cayman and its importance in maintaining soil texture and mitigation of reducing production of harmful gases e.g. Methane (CH<sub>4</sub>) per unit product, was a very important idea to these livestock producers that have decided to use their time, land and their financial resources to make investment on dairy cows and use it to create income and wealth for development of individual and households economy.

We are confident that the training provided to farmers and the demo plots established in these districts, will be a great catalyst for accessing quality fodder/forage seeds, so it will significantly help alleviate the nutritional challenge of livestock if good management of demo plots will be taken up by all stakeholders in this program starting by farmers themselves as the main owners of this work, extension officers, and all the professionals from CIAT, SNV and Solidaridad who involved in making this work possible.

### **Acknowledgment**

We would like to acknowledge CIAT, for enabling us to carry out this important exercise for dairy stakeholders in the Kilimanjaro and Tanga Regions. Thanks to SNV for facilitating access to the best Youth Agripreneurs group with whom we have worked well in this time. Many thanks goes to Solidaridad for their dedicated commitment to participating in the training, establishment of demo plots and funding the agreed work as budgeted.

Lastly, I would like to thank all the extension officers and dairy farmers for their good cooperation which has enabled this stage of the training and establishment improved forage demo plots in all regions.

### **(B) Forage demonstration progress and outcome**

Field activities associated with forage plant gap filling of the plots that did not germinate well, were performed during monitoring of the planted forage plots in Kilimanjaro (Siha, Hai districts) and Tanga (Muheza and Mkinga district) from 14<sup>th</sup> to 23<sup>rd</sup> October, 2020.

The objectives was:-

1. To inspect the physical condition of the planted forages (Brachiaria Cv Cobra and Cayman) in all demo plots in Kilimanjaro and Tanga Regions.
2. Conduct plant/forage gap fillings at the sites.
3. To learn from the current on-going forage demo and hear the perception of farmers from the established improved forages.

### **The condition of the forages**

The two types of Brachiaria forages (Cobra and Cayman) were established in the two regions. The *Brachiaria* Cobra seed germinated well compared to Cayman seed in all plots in both two regions. The moisture condition in Siha district was very low that largely affected germination and growth of established forages. This was different from Tanga regions (Muheza and Mkinga) where Brachiaria cv Cobra grew well due to sufficient moisture in the soils.



Brachiaria Cv Cobra established in Mkinga District – Tanga Region (60 days after planting)



Brachiaria Cv Cobra established in Siha District – Kilimanjaro Region (60 days after planting)

### Forage gap filling

Working with farmers, we were able to gap fill the plots that were not well germinated and this went well in Tanga Region where the soil was moist and allowed both weeding and a gap filling.



Gap filling of plants conducted in Muheza

## Demo plot observations

The soils in the demo plots were not fertile enough to support rapid plant and leaf growth. This led to agreeing with the farmers to put compost manure in the fields so that we can grow enough to allow planting on the individual farms and extend the group plots as they had planned.



## Perceptions on FFS

The group members perceived that the established improved forage Brachiaria Cv Cobra and Cayman will contribute mainly in reducing the shortage of dairy feeds especially in the dry period time because of the following distinguishing features they have observed;

- ✓ The Brachiaria are drought tolerant compared to other forages grasses.
- ✓ When the forages are properly taken care of (weeding, irrigation), and harvesting is well performed and on time, it will withstand a great deal of adverse conditions, therefore, they are sure to harvest a lot of biomass.

The forage demo plots have contributed to creating strong farmer awareness on different forage and forage grasses and how they can raise forage nurseries for obtaining improved seedlings. The farmers also felt that forage demo plots has helped to bring Ministry of Livestock extension workers, Research Scientists and other livestock development partners closer to farmers as previously they were not frequenting the locality.

They further felt that forage demo plots will help many dairy keepers in their neighborhoods to acquire knowledge on forage production, harvesting, conservation and utilization, hence, this will lead to better production from their dairy cows.



**A well-established Brachiaria Cv Cobra demo plot in Muheza District – Tanga Region**



### **Learning activities to farmers**

Farmers in other regions have extended the forage plots to each group member to maintain it and make sure that he/she produces enough forage at harvesting time as well as obtaining seedlings/splits to expand planting on their farms. This has helped the farmers' group to well maintain and take care of the forage plots.

### **Challenges observed**

The following were the challenges observed in the forage demo plots in Kilimanjaro and Tanga:-

- The shortage of water for irrigating the established forage demo plots in Siha was a big challenge.

- Lack of soil fertility observed in all regions though it had different intensities; Siha had serious challenge because the area has been used for a long for growing maize for both food and silage making.

**Way forward:**

As Farmers' groups in plan to start harvesting the forage they will be trained on farmers on proper harvesting, storage (hay and silage making), and utilization of forages. Concurrently training on environmental co-benefits of using forages that are friendly to the environment and feeding the same, as a strategy for reducing GHGs emissions to the environment will be included.