

Assessment of the Quality of coffee parchments in Southern Highlands of Tanzania: A case of Mbozi District in Songwe Region

Muyengi, Zakaria¹ * Mariam Mtunguja² Aziz Mtambo³ Iddi Chamshama⁴ Francis Ndunguru⁵ Tito Njowela⁶
 Alfonce Nanyanga⁷ Wilfred Kayombo⁸ and Steven Kihwele⁹

1&2. Agricultural Researchers, Mikocheni Agricultural Research Institute (MARI) of Ministry of Agriculture, Livestock and Fisheries (MALF). PO box 6226, Dar es Salaam. 3. Crop specialist, PO box 94, Mbozi, Tanzania,. 4. Cooperatives specialist, PO box 94, Mbozi, Tanzania,. 5. Crop specialist, PO box 94, Mbozi, Tanzania, 6. Crop specialist, PO box 94, Mbozi, Tanzania, E-mail:tnjowela@yahoo.com.7. Land Use Planner, PO box 94, Mbozi, Tanzania. 8. Irrigation Agronomist, Region Commissioners Office, PO box 754, Mbeya, 9. Economist, Ministry of Agriculture, Livestock and Fisheries (MALF). P.O. Box 9192, Dar es Salaam.

Abstract

It's unfortunate that even a single defective of a coffee bean can contribute to affect the receptive-lot of coffee. Coffee parchments or beans with high quality fetches high price in the world market. The study aimed at assessing the quality of coffee parchments along the post-harvest stages. Main focus was on improvement of post-harvest practices for coffee quality of coffee from farm level and to the processing under supervision of primary societies. The study involved coffee farmers in 6 Agricultural Marketing and Cooperatives Societies (AMCOS). Questionnaire, check list tools and physical observation were used for data collection. The result indicates that coffee farmers in Tanzania failed to fetch a good price from their produce due to low grades and classes of coffee parchments. Low grades and classes were observed to be attributed by application of poor practices along the coffee value chain. Our study suggests that, coffee stakeholders and the government should support the development of coffee sector along the value chain by up-scaling of good practices.

Keywords: Coffee Quality; Red-Cherries and Parchments, Mbozi Tanzania

1. Introduction

Agriculture is one of the leading sectors in Tanzania accounting for 29% of the GDP of the country (MALF, 2016). The sector produces about 65% of raw materials for Tanzanian industries (<http://www.tanzaniainvest.com/agriculture>). Also agriculture sector contributes about 30% of the total exports of the country through exporting cash crops like tobacco (33%), coffee (22%), cashew nut (15%), cotton (12%), cloves (10%) and tea (8%) (TCB, 2014). Coffee sub-sector is a second main exported crop behind tobacco and contributed approximately USD 186 million to Tanzania's export earnings in 2013 (<http://www.tanzaniainvest.com/agriculture>). Moreover, coffee production supports the livelihoods than 2.4 million individuals in Tanzania and up to 25 million families worldwide (TCB, 2012). Two types of coffee varieties are grown in Tanzania these are Arabica and Robusta. The concept of *Arabica/Robusta* varieties simply means beans with special flavours due to interaction of the geographic microclimates like altitude, latitude, soil, rainfall and temperature (Masumbuko, 2005). According to Tanzania Coffee Board (TCB) the specific areas which grows robusta variety in Tanzania are Kagera, Morogoro and Mwanza while arabica variety are grown in Kilimanjaro, Arusha, Ruvuma, Mbeya, Songwe, Kigoma, Iringa, Katavi, Manyara, Mara and Tanga regions. Kagera region is a main producer for robusta variety while Ruvuma, Mbeya/Songwe and Kilimanjaro/Arusha are main producer of arabica variety. The recent records by TCB (2014) showed the production fluctuation of coffee production in Tanzania, for example, in 2012/2013 the production of coffee in Tanzania increased to 71,200 tons from 32,590 tons of 2011/2012. Then the production of coffee decreased to 48,693 tons in 2013/2014 and increased again to 61,702 tons in 2014/2015. There are several reasons for fluctuation of coffee production in Tanzania, these includes both internal and external factors such as pests and diseases, tree aging, poor variety, un-reliable rains and prices (Baffes, 2003; Jaramillo *et al.*, 2011; Craparo *et al.*, 2015 and TACRI, 2016.) The possible effect of declining of coffee production at small scale level farmers is associated with low income at a household level.

Coffee quality is mainly determined by grade and class (MALF&JICA, 2015). If the grade and class are high, coffee is sold at higher price either in the auction or direct sales to the buyers. "Grade" depends on shape, size

and density (weight) of beans while “class” is subject to taste, aroma and appearance¹(TCB, 2014; JICA, 2015). The grades and classes in Tanzania released by TCB and used for price setting. There are about eight type of grades and sixteen category of classes. The grades types includes, AA, A, B, PB, C, AF and TT while the class categories, which are arranged according to the quality series from 1 to 16 (TCB, 2014).

Several stakeholders have been supporting the development of coffee sector along the value chain. The prominent stakeholders include Tanzania Coffee Board (TCB), Tanzania Coffee Research Institute (TACRI) and Coffee Curing companies. TCB has been mandated by the Government to coordinate and control the quality of coffee in the country while TACRI is responsible for research, seedling production, and extension and training services in its six research centers in Tanzania. Along the coffee value chain the curing companies are responsible for buying parchment coffee, storage and also processing. The fluctuation of price of the parchments has been associated with the uses of home red cherry pulper machines (HP) instead of coffee pulper unit (CPU), improper post-harvest treatments, prevalence of Coffee Berry Disease (CBD) and coffee leaf rust (TACRI, 2016). These have caused of low income and less revenue due to poor quality of coffee in terms of grades and classes and also low quantity/volume of the red-cherries per unit area. Therefore, the study aims at assessing the status of post-harvest treatments and quality control at farm level so as to increase the household income and also improvement of coffee quality during the post-harvest handling.

2. Methodology

2.1 Study area

Mbozi District is among the main coffee producer districts in Tanzania. Coffee contributes over 70% of the Mbozi district economy and over 85% of internal council revenue (DED, 2015). However, poor coffee quality (between class 5 and 9) and production challenges of coffee crop in the district led to securing low prices in the market and hence lower the farmer’s income and the councils’ revenue (DED,2015). Mbozi district lies between latitude 8° and 9° south of Equator and longitude 32°7’ and 33°2’ East of Greenwich Meridian. The district shares boarders with Momba District to the West and North West, Chunya District to the North East, Mbeya District to the East and Ileje District to the South. Administratively, Mbozi District Council is distributed in 4 divisions, 29 Wards and 622 Hamlets. According to the population census (2012) the district population was 446,339 (male 213,217 and female 233,122) at a growth rate of 2.7%. The district population at December 2015 is estimated to be 471,103 (DED, 2015).

2.2 Sample Selection and Sample size

In Mbozi district, the study was conducted in six villages namely Nkana, Mlangali, Ibembwa, Iyenga, Itumpi and Ilembo. In each village one Agricultural Marketing and Cooperatives Society (AMCOS) was purposively selected for the study and members were randomly selected for interview. The names of the selected AMCOS were Nkana AMCOS, Itumpi AMCOS, Ibembwa AMCOS, Mlangali AMCOS, Iyenga AMCOS and Agro & Investment from Ilembo village. The selection of villages and AMCOS was based on good records in coffee harvest. The total number of the sample size was 151.

2.3 Data collection and Analysis

The data used in this study were collected by using structured questionnaire and checklist. The questionnaire comprised of close and open ended questions in order to seek both qualitative and quantitative information. Data collected were analyzed by using Statistical Package for Social Science (SPSS) computer software.

3. Results and Discussion

3.1 Sustainable economic activities

According to MALF (2016) about 65.5% of the working group in Tanzania depends on agriculture for their livelihood. In the study area it was noted that about 99.3% of the respondents were mainly depended on agriculture for their livelihood and only 0.7% of the members depends on livestock and other activities. This means that agriculture is the most sustainable activity for most of the visited AMCOS members; hence more support to farmers should focus on agriculture activities. Also the results show that 84.8% of the farmers produce coffee as their main crop followed by maize (13.9%) and other crops such as groundnuts, sunflower and beans were 1.3%. This implies that Coffee is the main crop which generates money for household income stability and food security for most farmers in Mbozi District.

¹ “Appearance” matters both before and after roasting. Before roasting, it is normally important to note the way center cut looks like as well as color. After roasting, evenness of the roasted beans is checked.

3.2 Farm size and coffee trees owned by coffee farmers

The result reveals that most (72.2 %) of the farmers have an average of 3 acres. Only 15.2% of farmers possessed 8 acres. Moreover, the result shows that 87.4% of the farms cultivates coffee trees. This means that most of coffee farmers are small scale farmers and they supposed to apply good agricultural practices (GAP) to increase crop production at a small size of farm. Table 1 below indicates the coffee trees owned by AMCOS members. About 94% of the members were observed to own more than 501 but not exceeds 1000 trees of coffee and 4% of AMCOS member have less than 251 coffee trees. Only 2% of AMCOS members have between 251 and 500 coffee trees. This means that more efforts and interventions are required to increase the number of coffee tree per household level. According to the www.fao.org/docrep/006 about 1000 coffee trees can be grown per hectare.

Table 1. Coffee Trees per Household

AMCOS members (participants)	Coffee trees per household		
	up to 250	251 to 500	501 to 999
Itumpi (n=38)	.0%	.7%	24.5%
Iyenga (n=27)	.7%	.0%	17.2%
Ibembwa (n=15)	.0%	.7%	9.3%
Mlangali(n=29)	1.3%	.0%	17.9%
Nkana(n=25)	.0%	.0%	16.6%
Agro & investment (n=17)	2.0%	.7%	8.6%
Total (N=151)	4.0%	2.0%	94.0%

3.3 Harvesting, handling and processing of coffee cherries and parchments

Our study assessed the harvesting, handling and processing of coffee cherries and parchments by scrutinizing eight important treatment elements that might contribute to the coffee quality at a farm scale level. The important treatments considered were coffee picking, sorting, pulping, washing, soaking, fermentation, drying and soaking, storage and transportation.

3.4 Cherries picking

According to the coffee guideline, farmer should pick only ripe red cherries (MALF&JICA, 2015). The result indicates that about 90.1% of farmers picks the ripe red cherries, 9.3% sometime picks ripe or over-ripe but not diseased and 0.7% picks red cherries and sometimes including diseased ones, dried cherries or sand. This implies that, still there is a need of training on the types of cherries to be picked.

3.5 Cherries Sorting

Cherries sorting is a crucial step after cherries picking, it involves sorting out unripe, overripe, infected and diseased cherries (TCB, 2014). The result shows that about 77.5% of farmers sort their cherries individually and 15.2% of farmers do sorting through AMCOS. Only 7.3% of the farmers do not sorting their coffee. For a proper quality assurance at this stage of sorting, the sorting should be done at AMCOS level or at CPU place. This is because at CPU place there is a quality control unit. Sorting cherries at individual level is an indicator of having poor quality of parchments due to inefficient of quality control unit. It is therefore important to encourage the farmer to practice the sorting at CPU/AMCOS level and also the AMCOS should establish and strengthen the quality control committee (QCC) for checking the quality of coffee.

Table 2. Sorting of red-cherries

AMCOS members (participants) (N=151)	Sorting of red cherries			Total
	CPU	Individuals (without CPU)	Sorting is not done at all	
Itumpi (n=38)	4.6%	18.5%	2.0%	25.2%
Iyenga (n=27)	4.6%	11.9%	1.3%	17.9%
Ibembwa (n=15)	.7%	7.3%	2.0%	9.9%
Mlangali(n=29)	.7%	17.2%	1.3%	19.2%
Nkana(n=25)	1.3%	14.6%	.7%	16.6%
Agro & investment (n=17)	3.3%	7.9%	.0%	11.3%
Total	15.2%	77.5%	7.3%	100.0%

3.6 Coffee Pulping

Pulping is a process of removing pulps from red-cherry immediately within 8 hours of picking (TCB, 2014). Our result indicates that CPU and HP are main methods used for pulping of red-cherries in the study areas. Use of CPU correctly for primary processing improves the quality of coffee compared to HP and leads to higher sales price for farmers (TCB, 2014). The result shows that only 46.4% of AMCOS farmers uses CPU during pulping process and the majority (53.6%) of the farmers used HP (Fig. 1). This study therefore, suggests to the government and coffee stakeholders to support the AMCOS in installation and using of CPU for better quality of coffee pulping.

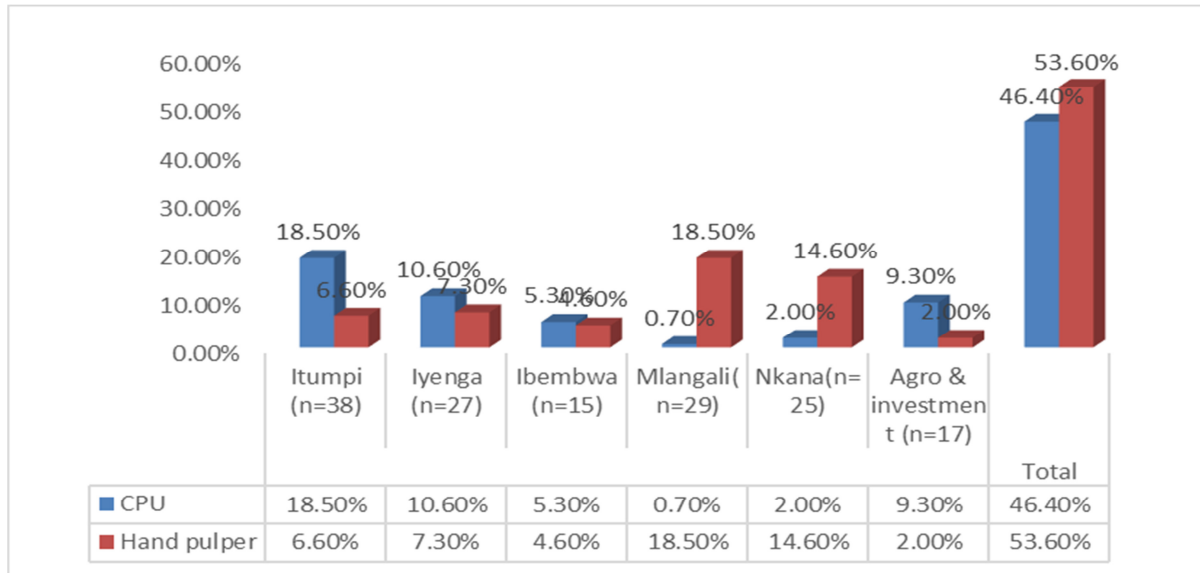


Figure 1. Method and tools used for coffee pulping

3.7 Washing of machines, tools and Quality of water used

Washing of pulping equipment/s after use is an important aspect for coffee quality assurance. Also at a CPU place, enough and clean water for pulping, fermentation and washing should be ensured (MALF&JICA, 2015). Our result indicates that about 89.4% of the farmers wash their pulping machines and tools after use. Only 0.7% of AMCOS members were hardly washed the pulping machines and tools. Moreover, 92.7% of AMCOS members were using clean water while only 7.3% of the farmers were not using clean water.

3.8 Soaking and fermentation

Fermentation is the process whereby coffee beans pass through the fermentation tank or pool for 24 hours then washed by enough water and then fermented again for 12 hours (TCB, 2014). Metals or polythene bags are not suitable for fermentation as it affects the quality of coffee. The result shows that 58.9% of people from surveyed AMCOS use tanks for fermentation and 13.2% use buckets and 27.8% use polythene bags. Nkana AMCOS observed to be the poorest in fermentation followed by Mlangali AMCOS. This implies that poor fermentation may cause poor quality of coffee beans. Therefore, training is needed to enhance the use of tanks for fermentation in order to increase quality of coffee.

3.9 Drying and sorting during drying

Proper drying involves the use of dry tables with wire mesh, turning the beans regularly, covering beans when the sun is too strong or it rains. Majority (71%) of AMCOS members dry their coffee on the drying table as it's required; while 28.5% do not dry their coffee on table hence their coffee is susceptible to dirtiness. Moreover, 90.1% of farmers observed to sort their coffee during drying. About 8.6% of farmers answered that they do sorting only occasionally and 1.3% said do not sort at all.

3.10 Storage (Use stores for storage of Coffee)

Coffee parchments should be kept in a clean and ventilated store after drying (TCB, 2014). About 74.2% of interviewees use a clean storage place with ventilation designed only for coffee, while 13.9% of interviewees use a mixed storage with other crops and 11.9% of interviewee store coffee anywhere in house. From this data we suggest that there is the need to provide training on the importance of storing coffee in the clean storage with ventilation designed for storing coffee only.

3.11 Types of bags used for storage

According to Coffee Management Service (CMS), new sisal bags are appropriate and recommended for handling and storing of coffee beans for better quality of coffee. About 40.4% of AMCOS farmers observed to use a new sisal bags while the majority (51.7%) uses sisal bags that were used in previous years and 7.9% uses chemical-fibre bags which are not recommended for coffee storage. This means that training aspects on the importance of using a new sisal bags every year is necessary.

Table 3. Type of storage materials

AMCOS members (participants) (N=151)	Type of bags used to store parchments		
	Sisal bags renewed every year	Sisal bags used previous years	Chemical-fibre bags
Itumpi (n=38)	11.3%	12.6%	1.3%
Iyenga (n=27)	6.6%	10.6%	.7%
Ibembwa (n=15)	2.6%	6.0%	1.3%
Mlangali (n=29)	10.6%	7.9%	.7%
Nkana(n=25)	1.3%	11.3%	4.0%
Agro & investment (n=17)	7.9%	3.3%	.0%
Total	40.4%	51.7%	7.9%

3.12 Transportation

Means of transport that used in the study area in transportation of parchments to the curing company was assessed. In principle, the transport means should be in good condition, clean and well covered without smell. This is because the dust or even a smoke smell from transportation medium can easily affect the parchments quality (TCB, 2014). Our result indicates that most (99%) of the AMCOS they used vehicles to transport coffee parchments to the curing companies. However, it have been witnessed by our researchers that some of the vehicles (20%) were scarcely covered. This means that in some of the vehicle the parchments were susceptible to dust. According to the DAICO office the district has established the by-laws which restricts the coffee transporters to carry coffee parchments without proper in-outer covers. Therefore, the existing by-laws should be reinforced accordingly by district authority i.e. to stop those vehicles with poor transportation facilities. On-top of that, training on coffee transportation should be considered to coffee transporters and farmers.

3.13 Farmers' knowledge on Coffee Quality and Marketing

3.13.1 Coffee grades and classes

Coffee quality is mainly determined by grade and class (MALF&JICA, 2015; TCB, 2014). Coffee grades and class are subject to appearance, size, taste and aroma. In the study area about 77.5% of the respondents observed not to be aware with grades and classes of coffee. This means that AMCOS members do not know the relationship between grades/classes and coffee price. Training and awareness creation should be carried out to AMCOS members and coffee farmers on the importance of having a good grades and classes of coffee.

3.13.2 Coffee Marketing

In the visited areas the market thread of coffee starts at farm level. Farmers may sell their coffee parchments as individual or groups through their societies. Then the parchments taken to the curing companies and auctions. The auction includes coffee buying companies around the world. The price of coffee is unpredictable and very sensitive to quality and also the supply and demand of coffee in the world market. In the study areas it was noted that coffee farmers were complaining on receiving low price per kg and also the reductions from the curing companies. Left behind the reductions which we suggest to be a further research topic, the understanding on price per unit of coffee in relation to quality is very limited by most of the respondents (77 %).

4. Conclusion and Recommendation

Results from our study conclude that coffee crop is a potential crop for creating and increasing income at household and national level. However, poor harvesting and treatments techniques of red cherries and parchments could be among of major factors limiting the good price at farm level and national level. Poor harvesting and poor techniques in coffee processing are likely happening in different parts of the country which producing coffee. Despite of this study being aware about different interventions on production and improvement of coffee quality in Tanzania which are going on through TCB and other stakeholders like JICA and curing companies mentioning a few but still more strategic plans should be taken. Therefore, our study recommends the collectively plans, strategic initiatives and sustainable investments to be taken by both coffee stakeholders in particular the government, private sector, donors, NGOs and farmers so as to develop, improve and sustain the coffee crop along the value chain. At AMCOS level, the study recommends the scaling-up of

good practices which available or/and introduced in the district. Also the AMCOS should establish and strengthen the quality control committee (QCC) which has an important responsibility for checking the quality of red-cherries/parchments. Moreover, the DAICOs office are advised to mobilize farmers to form and join the cooperatives (AMCOS) and also should create an awareness to farmers on coffee quality.

Acknowledgement

The Authors would like to thank the coffee farmers, AMCOS leaders and members for providing the detailed information on coffee production and processing during the interview. Also, Mbozi-DAICO office for allowing the officers to participate fully in this study and last but not least to thank JICA-RADAG for the financial support throughout this study period.

References

- Baffes. J; (2003): Tanzania's coffee sector. Constraints and challenges in a Global Environment, Africa Region working paper series No.56
- Craparo. A, Van Asten. P, Laderach. P, Jassogne. L, Grab.S (2015): Coffee Arabica yields decline in Tanzania: Global implications.
- District Executive Director (DED) office (2015): Participatory Coffee value chain Development. The case of Mbozi District Council-Songwe Region.
- Jaramillo.E, Muchungu. F, Vega. A, Daris. C (2011): The influence and implications of climate change on coffee berry borer (hypothenemus hamper) and coffee production in East Africa.
- Linus Masumbuko (2005): Study of genetic diversity and micropropagation of coffee Arabica L.and evaluation of genetic diversity in Cocos nucifera L.from Tanzania.
- Ministry of Agriculture, Livestock and Fisheries (MALF) and Japan International Cooperative Agency (JICA) (2015): The Technical Supporting Manual on Coffee Quality Improvement.
- Ministry of Agriculture, Livestock and Fisheries (MALF) (2016): The Government Budget Speech for the Ministry of Agriculture, Livestock and Fisheries as it provided by the Minister in the Parliament of FY 2016/2017 at Dodoma Tanzania.
- National Agriculture Policy (NAP) of the Ministry of Agriculture, Livestock and Fisheries- Tanzania, 2013
- Tanzania Coffee Board (TCB) (2014): Tanzania Coffee Industry Overview (www.coffeeboard.or.tz).
- Tanzania Coffee Research Institute (TACRI) (2016): The Role of TACRI in coffee development. The presentation made by TACRI-Mbimba during the Coffee Stakeholder Workshop in Mbeya.April-8, 2016.website; www.tacri.org
- Website; <http://www.tanzaniainvest.com/agriculture>. As it visited on 12 April 2016