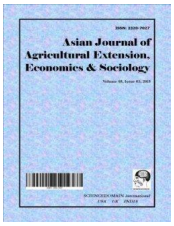

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# Impact of Ginger Farming to Smallholder Farmers' Income in Tanzania – Case of Same District

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***Author's contribution***

*The sole author designed, analyzed and interpreted and prepared the manuscript.*

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## ABSTRACT

The study aimed to assess the contribution of ginger farming to smallholder farmers' income in Same District Tanzania. A cross sectional research design was adopted; sample sizes of 244 respondents were obtained through purposive and non-purposive sampling techniques. The study has used both quantitative and qualitative methods approaches. Statistical Package of Social Sciences (SPSS) and Microsoft Excel (Ms Excel) were used to analyze data. The study used both quantitative and qualitative methods for data analysis. The data revealed that ginger production is profitable, with the gross margin of TZS 7,050,000[1] per acre/per annum. Returns to labour for ginger production revealed to be TZS 33,894.23.The data further, revealed that majority of respondents (71.3%) reported that their income accrued from ginger business were between TZS 1,000,001 to TZS 5,000,000 per annum whilst others few (1.7%) reported that their income were above TZS 10,000,000 per annum. Finally, the study found that the major problems affecting ginger farming in

[1] *1 US $ = TZS 2237.2*

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the district included; Low price fetched (54.5%) and inadequate capital to run the business (27%). Other factors included poor transportation, drought and unavailability of laborers. The higher returns to labour observed in ginger farming enterprise could have been contributed to adoption and use of labour saving technologies such as oxen-plough and use of improved seeds. The profit from ginger contributes significantly to the household income. Hence, it is important to create public awareness on the potential for the sector. The study also recommends for farmers to increase land under cultivation, define a more constructive role for the farmers union and discourage farm gate prices by establishing selling points which also offer value addition and storage facilities.

*Keywords: Ginger; income; gross margin; labour; returns.*

## 1. INTRODUCTION

Agriculture is the key sector of the economy and contributes immensely to poverty reduction especial on rural areas income, food security and is one of the pillars of implementation National Strategy for Growth and Reduction of Poverty (NSGRP II) or '*Mpango wa Kukuza Uchumi na Kupunguza Umaskini"* ("*MKUKUTA") in Swahili* [1]. Contribution of Agriculture and agribusiness is still immense in the Tanzanian economy contributing USD 13.9bn to its Growth Domestic Product (GDP) around (30%), 95% of the food and about 12% of national export earnings (ibid). As reported at the 2012 National Census, 67.1% of Tanzania's total population (43.6 million) lived in rural areas and employed in agriculture equal to 29.2 million people and approximately 5.8 million households [1].

Cognizant, half of the labor force in the agriculture sector is women and over 15 million smallholder farmers in the country, more than seven million of whom are women [2]. Agriculture in Tanzania is dominated by smallholder farmers (peasants) cultivating an average farm size of between 0.9 and 3.0 hectares each with limited access to modern technology, machinery and inputs [3]. Similarly, these farmers work on subsistence basis and can be pushed easily onto poverty by *weather fluctuations (drought or floods), biotic stress and other external shocks notably food price fluctuations* poor *access to information, innovations, value added initiatives, improved varieties and good quality seeds*. This lead to insufficient returns as compared to production costs.

Agricultural sector continues to record a smaller growth rate of average of 4% and surprisingly decline to 2.3 percent in 2015 compared to 3.4 percent in 2014 [4].

In 2001, the government approved the Agricultural Sector Development Strategy (ASDS I) with a view of among other things, promoting spices farming. This was one of the possible interventions of developing agricultural sector [5, 6] and which in turn would address some of the above identified constraints. This measure was expected to contribute to agricultural growth, reducing poverty and contributing to the objectives of the NSGRP and the Tanzania Development Vision 2025. Ginger is among important spices produced in many parts of the country including: *Coast, Tanga, Mbeya, Ruvuma, Morogoro, Kilimanjaro, Kigoma and Kagera regions*. Ginger production in Tanzania, is dominated by s smallholder farmers who use a little or no agricultural inputs at all.

Fig. 1 show that ginger production in Tanzanian is approximately 60 thousand tonnes in 2008/09, which is considerably more than production levels of the years before and dramatically decrease in two consecutive years [7]. Then attain constant production from 2011 to 2013 (ibid). The probable reason of the trend could be low prices and poor agronomical practices. Income improvement is an incentive for increasing crop production by the smallholder farmers whereas the increase in price of the crop produce is an incentive for an optimal smallholder resource allocation. The end result is a profitable farming in the sub-sector and hence, improving in the standard of living of the smallholder farmers [8]. Therefore, most of literatures empirically indicate the benefits, constraints and the major determinants of ginger production farming.

The value of Tanzania's exports has risen from $8.46 billion recorded in December 2013 to $8.81 billion for the year ended December 2014 due to the good performance in exports of manufactured goods and travel receipts**.** The monthly economic review of the Bank of Tanzania (BOT) suggests that, a significant increase of 33.8 percent was recorded in the

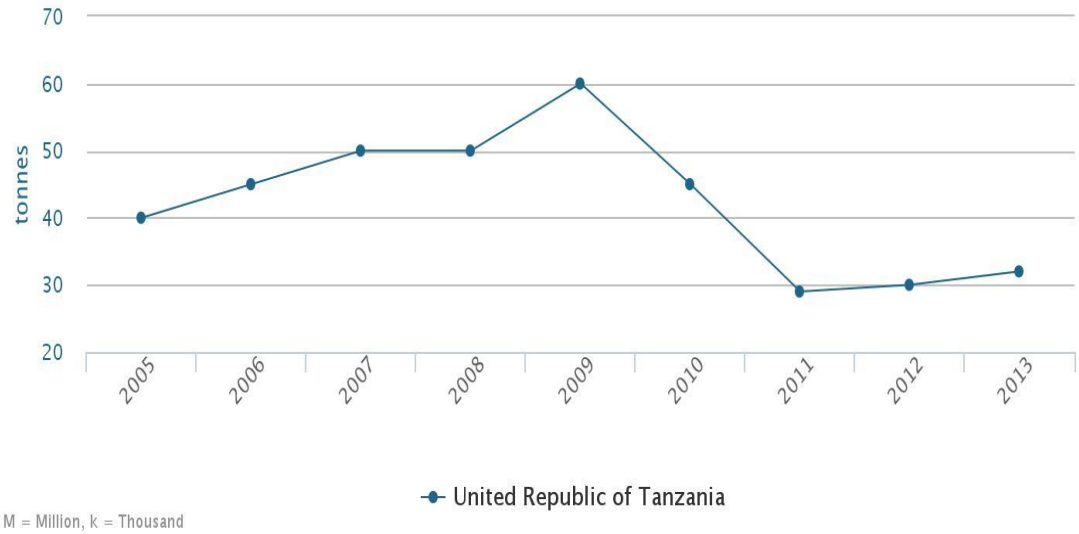


**Fig. 1. Ginger production 2005 -2013 in Tanzania**
*Faostat, 2015*

export value of goods such as edible oil, textile apparels, plastic goods, fertilizers and paper products. The collective value of these goods consequently rose to $1.43 billion [9].

The empirical evidence shows that few researches have been conducted in Tanzania to assess the profitability of ginger production using Gross Margin Analysis specifically in Same District. By employing a Gross Margin Analysis technique this study therefore intends to make an analysis of ginger profitability to rural households farmers in Same District. Based on previous studies, ginger farming has attracted serious concern from Government. Although there are both successful and unsuccessful cases of in ginger farming, it can be hypothesized that ginger farming arrangement has a positive effect on benefits for smallholder's farmers. Therefore, the objective of the paper is to determine the profitability of ginger farming to the smallholder farmers. Likewise, the study is guided by question which states that "What is the output per unit area under ginger farming?

## 2. RESEARCH METHODOLOGY

The data used in the study were drawn from a survey of 244 household heads in same district in April 2016**.** Same district was selected because is among the largest producer of ginger in Tanzania.

Multistage sampling technique employed to the sample smallholder farmers. The technique was chosen because it accounts administrative units from divisions, wards and villages scattered in a wide geographical area. From each division, three wards were purposively chosen from the respective sampling frame, and from the list in each selected ward, two villages were purposively selected to get a total of six (6) villages namely *Sambweni, Mamba, Myamba, Goha, Mweteni, Vugwama and Mpinji*. Therefore, the targeted study population was 31,100 people from three wards; Mamba Miamba (13,168 people); Mpinji (8,453 people) and Bwambo (9,479 people) [10]. The sampling frame of the study was selectedwas obtained from Mamba *Miamba Wards, Mpinji and Bwambo* wards which comprised a total of 13,168 people in the study area in the total population of 269,807 (ibid).

The researcher applied three types of sampling procedures namely stratification sampling, systematic random sampling and judgmental sampling. The sample size was determined using stratification techniques. Form each stratum, 0.0078 of the stratum size was required**.** Every unit in a stratum has same chance of being selected. In other words, the population was grouped according to their strata such as selected wards.

Using this systematic household heads were selected skipping every 5th household in the village list. The researcher conducted individual interviews for the randomly selected household heads using semi-structured questionnaires.

Then purposive sampling technique enables the researcher to choose respondents basing on the fact that, they have desirable characteristics related to the issue being studied [11]. The mentioned officers were selected by the virtual of their positions because they were well informed on ginger farming.

## 2.1 Model Specification

To facilitate the realization of objective the researcher used a Gross Margin Analysis (GMA) to assess whether ginger farming has been profitable or not.

### 2.1.1 Gross Margin Analysis (GMA)

Often, new technologies in smallholder agriculture are aimed at increasing farm productivity, with a subsequent increase in income which is one of the immediate objectives of the overall farmer's enterprise. However, the costs associated with new technologies and new production as well marketing arrangements might hinder the adoption [12]. Thus, it was found useful to analyze the gross margins of ginger.

The study interested to establish whether ginger farming is profitable or not. By using discounting technique, ginger gross margin and returns to labour for 2014/2015 will be discounted at 5% (market interest rate), to obtain the present value which was compared with the average gross margins and returns, to the labour in the study area. To define the concept of gross margin, we first have to distinguish between variable and fixed cost. Variable costs are those cost that increase or decrease as output changes; while fixed costs do not change as output change [13]. Common examples of variable costs in crop production include seeds, fertilizers, and pesticides. The most important fixed costs in agricultural production are owned land, family labour, farm buildings, farm machinery, and implements.

This study analyzed the cost and return in ginger production to obtain the net income trend in general in order to evaluate the extent to whether it impact to the income generation to ginger growers farmers in Same district. The analysis was based on the following model;

$$GM = \sum_{i=1}(TR - TVC)$$

$$TR = Total\ sales\ or\ revenue\ per\ annum$$

$$TVC = interest\ paid\ + other\ indirect\ cost$$

Thus, the net income was obtained as follows:

$$Net\ income = GM - (FXC + r + e)$$

Whereby;

| | |
|---|---|
| $GM$ | Gross margin |
| $TR$ | Total revenue |
| $TVC$ | Total variable cost |
| $FXC$ | Fixed cost |
| $r$ | Interest paid on loan repayments |
| $e$ | Other indirect cost |
| $\sum$ | Summation of |

Researcher contacted potential ginger farmers and district officials. In total 244 farmers from six (6) villages constituted the sample for the study.

## 3. RESULTS AND DISCUSSION

The researcher wanted to know the land size of respondents with an idea that can influence on ginger production. The results were as shown in Fig. 2. The data shows that substantial number of farmers owned an average of 0.5 – 2.5 acres (34%), 29% 2.6 - 4.6 acres. This data appealed that this land is under parcels due to nature of same district. The household survey – considering all three communities together – indicates that the percentage of people engaged in farming. This means that ginger farming has become more significant. As the focus on farming and, the overall *in situ* livelihood diversification decreased.

## 3.1 Parcel Sizes

The researcher determined the parcel sizes owned by farmers and its effect to agricultural resource planning. The data shows that majority of producers own one to four parcels with sizes between 0.5 acre to 2.5 acres and usually the first parcel is large than the subsequent ones (Fig. 3). Land fragmentation is prevalent in District. All these problems hindered them from having a contiguous land that can be cultivated under mechanization and impeded farm productivity [14,15,16].

## 3.2 Land Acquisition

The researcher investigated how land tenure influence ginger production. The results were as shown in Fig. 4. Land acquisition is the pre-

condition for any crop production including ginger in the study area. Ginger farmers acquire land in three major modes namely inheritance, purchasing and offer from the village authorities. From Table 4, it shows that majority (74%) of sampled farmers acquired land inheritance, 22% through purchasing and 4% acquired land by offer from the village authorities. The average total area under cultivation owned by respondents was 1.5 ha. This is above the average landownership and occupation in accordance with the villagisation programme of 1960s and 1970s, which requires a household to have a homestead plot of about 0.5 ha [17].

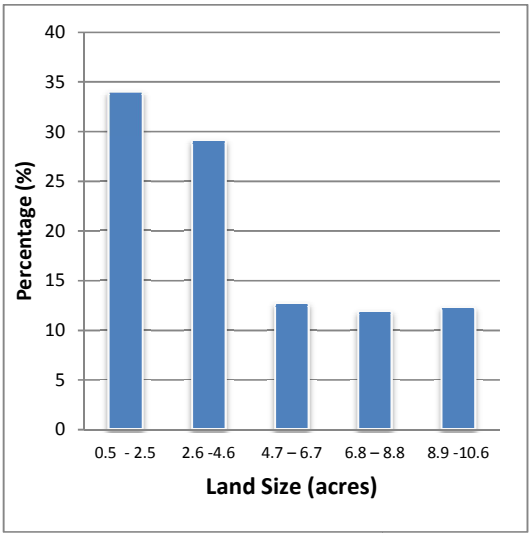


**Fig. 1. Land size under ginger farming**
*Source: Survey Data, 2016*

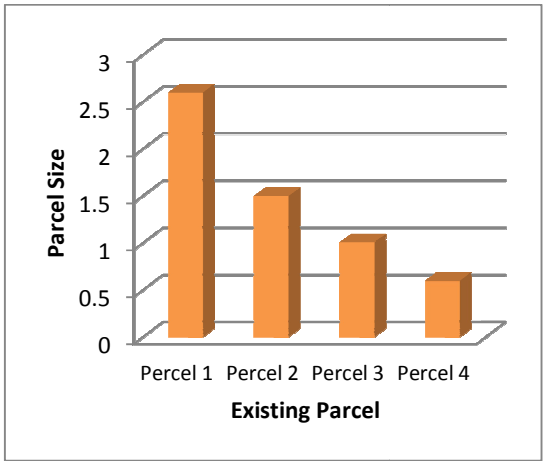


**Fig. 2. Parcel size cuiltivated**
*Source: Survey Data, 2016*

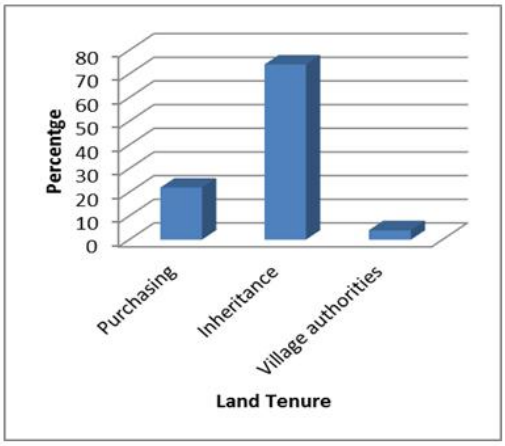


**Fig. 3. Land Tenure System**
*Source: Survey Data, 2016*

### 3.3 Profitability of Ginger Farming to Smallholders Growers

The researcher wanted to assess the contribution of ginger farming to household income. The researcher used budgeting techniques to establish gross margins for ginger crop enterprise under 2015/2016 growing season.

From Table 1(a, b, c & d) the results suggest that ginger production is more profitable, with the gross margin of TZS 7,050,000 per acre. Returns to labour for ginger production revealed to be TZS 33,894.23.The higher returns to labour observed in ginger farming arrangement could have been contributed to adoption and use of labour serving technologies, use of improved seeds, the use oxen-plough. In addition, the yield of 7,000 kg/acre recorded in in average for three years farming season is another reason for the higher returns to labour obtained from ginger enterprise. *These results justify the rejection of the research question that ginger farming in Same-District is not profitable*.

However, when family labour is valued at the prevailing market wage for hired labour, the average cost for labour for ginger production was found to be Tsh. 1,040,000 per acre (208 mandays/acre x TZS 5000/mandays). This brings total production costs to TZS 3,490,000 per acre. From Tables 1(a,b,c&d) shows that when total costs are deducted from total revenue, ginger farmer in the study area remains with TZS 7,010,000 which is very significant profit margin. Since social price for labour is the output foregone in other parts of the economic activity

as a result of employment in the ginger production, farmers particularly in the study area have to spend their labour in ginger production since ginger is the only cash crop with reliable market and climatic suitable in those areas.

**Table 1a. Farm activity vs man-days**

| Farm Activity | [a]Man-days |
|---|---|
| Farm clearing | 40 |
| Fertilizer (FYM) | 20 |
| UREA | 10 |
| Irrigation (2-times per week) *6 months | 48 |
| Planting | 10 |
| Harvesting (in piece meal) | 40 |
| Transportation | 20 |
| Storage | 20 |
| **Total -Man-days** | **208** |

*Source: Survey Data, 2016*

**Table 2b. Total costs**

| Physical inputs | Quantity | Total costs (TZS) |
|---|---|---|
| Fertilizer (FYM) | 1000tins | 600,000 |
| UREA costs | 50Kg | 50,000 |
| Seed | 100Kg | 1,800,000 |
| [b]Total Costs of Physical Inputs | | 2,450,000 |
| Labour Costs (208Manday *TZS 5000per day) | | 1,040,000 |
| **Total Costs** | | **3,490,000** |

*Source: Survey Data, 2016*

**Table 3c. Gross returns**

| [c]Average yield | [d]Average price | Gross returns |
|---|---|---|
| 7000Kg | 1500 | 10,500,000 |

*Source: Survey Data, 2016*

**Table 4d. Gross margin and return per man-day**

| Gross returns | Total cost | Gross margin | Return per man-day |
|---|---|---|---|
| 10,500,000 | 3,490,000 | 7,050 ,000 | 33,894.23 |

*Source: Survey Data, 2016*

*[a]Man-days: Labour requirement as obtained from secondary data*

*[b]Total costs for physical inputs as computed from secondary data*

*[c]Average yield for three consecutive seasons computed from secondary data*

*[d]Average price for three consecutive seasons as computed from secondary data*

## 3.4 Transport Costs to the Marketing Areas

The researcher also wants to show that transport cost also has significant impact on the production of ginger and hence household income. The results were as shown in Table 2. The study revealed various transport costs from the ranges TZS. 50/= to TZS. 250/= each per kilogram of ginger, the transportation cost is very important to be determined because it has impact on the ginger production, also the cost various depending on the location of the farm and season, During, rainy season the road becomes rough therefore the transportation cost increase. Furthermore, It was noted that the maximum transport cost incurred is Ths 250/= while the minimum transport cost incurred is Tsh. 50/= with the average transport cost of TZS. 150/= per/kg of raw ginger.

**Table 5. Transportation cost (TZS/Kg)**

| Costs (Tsh/kg) | Frequency | Percent |
|---|---|---|
| 50 -100 | 68 | 27.9 |
| 101 -150 | 111 | 45.5 |
| 151- 200 | 59 | 24.2 |
| 201 -250 | 6 | 2.4 |
| **Total** | **244** | **100.0** |

*Source: Survey Data, 2016*

## 3.5 Ginger Prices

The researcher also determined price of raw ginger and its significant impact on the production level of ginger and hence household income. The results were as shown in Table 3. The data revealed that selling price of the ginger per kilogram, In Same district the selling price are subjected to fluctuation depending on the time one sells his or her products, According, to the survey the ginger prices may increase up TZS 3000/= per/kg during off season and may fall up to TZS 1000/=per/kg during the season where the supply will be very high leading to the fall in the price. Therefore, in Same the average price of ginger per/kg was TZS. 1600/= this information is very useful as it helps to calculate the revenue received by the ginger farmer and hence being able to calculate the profit margin of the ginger product.

## 3.6 Sources of Credit to Finance Ginger Farming

The researcher was interested to identify sources of credit of ginger farmers as might affect production of ginger and hence household income. This information is important because the researcher want to examine the profit margin of each ginger farmers therefore their

sources and costs of capital is very important in determining that level of the profit each farmer is obtaining. The results were as shown in Table 4.

**Table 6. Percentage distribution on average price of ginger**

| Variable | Av. selling prices Tsh/Kg |
|---|---|
| Mean | 1606.6 |
| Minimum | 1000.0 |
| Maximum | 2200.0 |

*Source: Survey Data, 2016*

**Table 7. Source of credit to finance ginger farming**

| Sources | Frequency | Percent |
|---|---|---|
| Revenue from selling of last season and loans | 178 | 73 |
| Income from driving motorcycle | 42 | 17 |
| Carpentry | 15 | 6 |
| Employed | 9 | 4 |
| **Total** | **244** | **100** |

*Source: Survey Data, 2016*

The data revealed that farmers depend on the informal financial sector particularly Self-Help Groups (SHGs) and individual money lenders for credit. The SHGs include farmer's groups like Association and Marketing Cooperatives Societies (AMCOS), Village Savings and Loan Association (VSLA), Rotating Savings and Credit Associations (ROSCAs) and other local arrangements. Farmers in the area possessed relatively low property rights and are rated low by providers of farm credit. Minority obtain loan from formal sources Civil Society Organizations (CSOs). Table 4 shows that majority of respondents 73% of ginger farmers depend on the revenue from the last season sells revenues and loans as their source of income to finance ginger farming operations, while 17% depends on the income received by driving motorcycles, whilst 6% depends on carpentry activities and the rest of the respondent are employed as public offices (4%). One can conclude that the famers have no reliable sources of credit to improve ginger production this lead to no outstanding debts as all of the debts where cleared during this selling season 2015/16 form informal sources. Capital is very important because of its ability to engage or motivate other factors of production. It acts as a catalyst or elixir that activates the engine of growth, enables it to mobilize its inherent potentials and to advance in the planned or expected direction [18]. If farmers possess credit, he could overcome his destruction by applying credit to purchase needed equipment goods and services to attain a more efficient use. From the table, the lending sources of credit is personal savings because of these institutional sources cannot be easily access by the farmers. Also, it shown from the table that as the sources of capital of the fishery farmers increases, their efficiency level also increases.

## 3.7 Value of Loan Taken by Ginger Farmers

The researcher was interested to determine the value of loan credited to ginger farmers as might affect production of ginger and hence household income. The results were as shown in Table 5. The findings reveals that 70% of the ginger farmers took the loan between the Tsh. 100000 to 199999, while 12% of the ginger farmer received loan between 200000 - 299999 and 18% received between 300000 - 399999. The information is important because it helps to determine the amount that has influence on the profit each farmer is obtaining. The amount of taken to were very small due to fear of uncerternity to invest in agriculture. It was observed that the farmers allocated part of the loan to buy fertilizer, pesticides and labour charges. Moreover, it was noted that farmers spend TZS 1,040,000/= (Table 1). The information is very useful as it provides the clear picture of total cost incurred by the farmer in the production of ginger.

**Table 8. Value of loan credited**

| Value of loan credited (Tsh) | Frequency | Percent |
|---|---|---|
| 100000 – 199999 | 170 | 69.8 |
| 200000 – 299999 | 30 | 12.2 |
| 300000 – 399999 | 44 | 18.0 |
| **Total** | **244** | **100** |

*Source: survey Data, 2016*

## 3.6 Ginger Production

The researcher was interested to assess the output to small-scale ginger growers with an idea that it was influenced by Ginger farming. The results were as shown in Fig. 5.

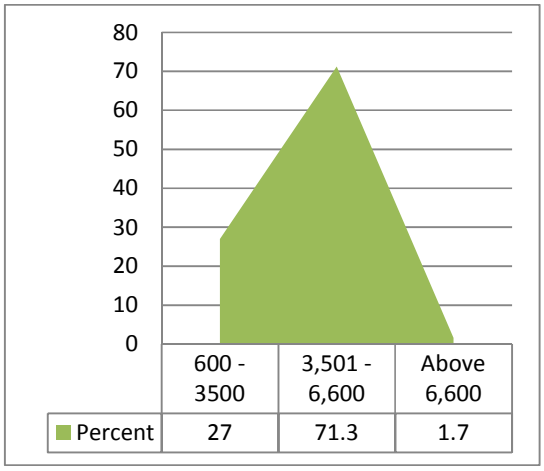


**Fig. 4. Ginger income among farmers**
*Source: Survey Data (2016)*

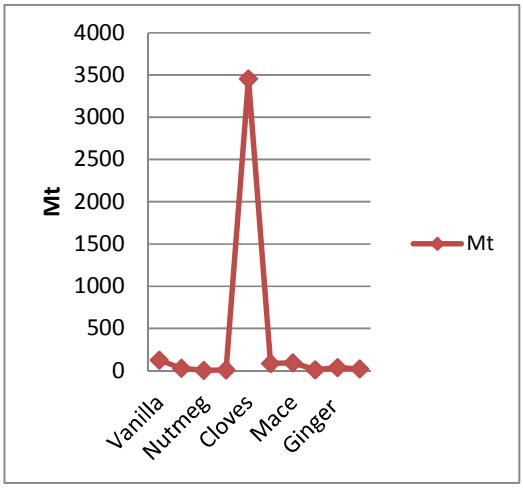


**Fig. 5. Tanzania spice export basket in 2008 by percent of export value and metric tones**

The study assessed income accrued from the sector. The finding revealed that majority of respondents (71.3%) reported that their output were between 3,501Kg to TZS 6,6000Kg and (27%) respondent explained that their output ranges from 600Kg to 3500Kg whilst minority (1.7 %) reported that their output were above 6600Kg per annum (Fig. 4). The improvement of income is an incentive for increasing crop production by the smallholders whereas the increase in price of the crop produce is an incentive for an optimal smallholder resource allocation. The result is a profitable farming in the smallholder sub-sector and hence, improving in the standard of living of the smallholder farmers [8]. *The results further underlined that ginger output contribute significantly to the household livelihood.* Compared to output of other agricultural crops like maize and other informal sectors. The sector is above the National per capita income which is US$ 293 [19].

Spices including ginger have volatile market but growing global demands (8.5%). The min spices exported mainly cloves, pepper and vanilla. The main markets are EU/US, far East, regional markets, Largest markets: India (30%), Singapore (24%) and Saudi Arabia (21%), EU market: 4.6% (mostly vanilla and pepper) (without cloves the EU market is 56%) EU market 2% growth per year [20].

In general, low quality: 50% of production is therefore sold locally; Traders/exporters apply ISO, ASTA standards, HACCP, Global Gap and GMP.

No chemicals used (pest, herbi, fungi cides) and no heavy metals.

## 4. LIMITATIONS OF THE STUDY

i. The present findings are based on Tanzania specifically Same district there is a need to replicate the findings in different countries having different cultural contexts to have generalized findings.

ii. The current study was conducted at a single time point.

## 5. CONCLUSION

- Ginger production is more profitable business one to engage. The crop has high returns to labour, the higher returns to labour observed in ginger farming arrangement might have been contributed to adoption and use of labour serving technologies, use of improved seeds, the use oxen-plough.
- In addition, the yield recorded is another reason for the higher returns to labour obtained from ginger enterprise.
- In general lack of local knowledge on quality and local standards for black, white pepper, chilies and capsicums, cardamom, curry, ginger, cloves and turmeric through Tanzania Bureau of Standards

## 6. RECOMMENDATIONS

i. Encourage ginger farmers to increase land under ginger cultivation. Smallholder farmers own small parcels of land but cultivate only small portions. Smallholder farmers need to be assisted to expand the area under cultivation. This may help transform the current farming system from smallholder farming to larger scale.

ii. To define a more constructive role for the "*Chama cha Msingi cha Wakulima wa Tangawizi Mamba*" primary cooperative.

iii. Discourage farm gate prices by establishing selling points which also offer value addition and storage facilities. These efforts will likely act to increase the prices received by farmers for ginger production.

## CONSENT

As per international standard or university standard written consent has been collected and preserved by the author.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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