***Original Research Article***

**Organic Spices Farming in West Districts, Zanzibar: It’s Contribution to income of Smallholder Farmers**

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ABSTRACT

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| **Aims**: In recent years, organic agriculture has been gaining considerable importance. Many farmers today show interest all over the world in organic farming. The concept of organic farming is not new, but it has been scantly studied. Organic spice farming is therefore, requires to be studied widely. Spice production is a popular economic activity in Zanzibar. The purpose of this study was to assess the contribution of organic spice farming to income of the smallholder farmers. **Study design:** The study adopted a cross-sectional research design Place and Duration of Study: The study was conducted in two districts of Zanzibar, the West and Central districts between August 2018 and September 2018.**Methodology:** A random sampling procedure was used to obtain 120 households. The households were categorized from three clusters namely: merely organic, certified organic and inorganic spice farming farmers. Data were collected using a household questionnaire survey.**Results:** Descriptive statistics were used to analyze the data. Among the three types of spice farming, inorganic spice farming averagely produced 174.3 kg/household, followed by merely organic (86.3 kg/household) and certified organic (70.2 kg/household). However, certified spice farming households earned in average 565 900 TAS higher than others (merely organic (361 170 TAS) and inorganic (350 500 TAS)). Further, certified spices contributed to 26.2% of the total household’s income, followed by merely organic (23.1%) and inorganic (19.0%) spices. **Conclusion:** The study concludes that spice farming increased income among households. Therefore, there is a need of putting more effort in spice farming improvement, particularly certified organic spice farming as it gives high earnings to the households.  |

*Keywords:* certified spice, organic farming, organic farming by default, smallholder farmers, income

1. INTRODUCTION

Spice production is a part of horticultural industry which has a significant contribution to income of smallholder farmers in Asia, Latin America and Africa (IFAD, 2008) whereby about 86 types of spices are grown (Panda, 2010; ITC, 2007). Spice farming can be categorised into three types; the certified organic spice farming, merely organic/organic by default and inorganic spice farming. Certification of organic spice came after the registration and adhering to basic organic principles as stipulated by responsible certification body (Firmino, 2010). Spice farmers can practise merely organic/organic by default spice farming but if they are not certified it cannot be considered as organic. The difference between certified and organic by default is only lack of certification to the default organic farming; however, this difference can have a big impact on export market. The organic by default farming system is also known as uncertified organic spice farming (Maurya, 2014). Inorganic spice farming refers to those which use industrial chemicals including fertilizers and pesticides.

According to Research and Markets (2016), increasing demand for organic spices and marketing campaigns are expected to give a major boost to the growth of the global market in the near future. Organic segment accounts for about 10% share of the total spices market and it is expected to grow in the next few years as the preference for organic spice as healthy products have been increasing more than inorganic products in the world market (Panda, 2010). In fact, globalization, varying demographics, and medicinal benefits of spices are among the factors, driving the growth of the global spices market. Spices play a significant role in the national economies of several spices producing, exporting, and importing countries, hence, the preferences of organic spices promise a fortune in terms of good prices for organic spice farmers than their counterparts.

Organic spice farming has been remarked to bring improvement to livelihood outcomes of grass-root producers in various regions of the world such as Asia, Africa and Latin America (ITC, 2007). In Zanzibar, most farmers practice the traditional form of spice farming, which to certain extent, resembles organic practices that lead the farming to be classified as ‘organic by default’. Moreover, many of these ‘organic by default’ famers do not practice important organic principles as defined by organic farming organizations partially due to lack of knowledge on economic gain of certified organic spice farming (Mikidadi, 2011). Nevertheless, these farmers are in a position to step up production of organic spices as per European Commission (EC) organic food standards and fetch a premium price in the international market of up to 20-50% and in some cases 100% (Panda, 2010; Spice Cluster of Sri Lanka, 2002) and fill the gap for international market if they can access adequate scientific support for production and quality improvement (Spice Cluster of Sri Lanka, 2002). Currently, the demand for organic products is steadily increasing in the western market at 20-25% every year and that of inorganic spices at about 2% (Acharya *et al.,* 2015).

Effort to promote non-traditional export crops has focused on spices as a major crop in Zanzibar (Dadzie *et al*., 2009). The international market prefers certified organic spices than other types of spice; smallholder farmers who certified their organic spice seemed to have premium prices for their produce. However, there is also little empirical evidence on the contribution of spice farming to the farming household income. Nevertheless, in order to capture the market of organic spices internationally, farmers, recently have gone further calling for certification for their spices produced (ProFound and Mugenyi, 2012), and to some extent this has proved to increase prices of spices (Post and Schahczenski, 2012). Certification of organic spice farms has been recently introduced; however, benefits of this process have not been quantified. Due to scarcity of information regarding the contribution of the certified organic spice product in Zanzibar, this study opted to analyze the importance of organic spice farming to income of smallholder farmers in Zanzibar.

Zanzibar is among the major spices producing areas in the United Republic of Tanzania (Juma, 2010). Despite the long history of Zanzibar in spice production there is inadequate information on the importance of the certified organic spices farming to smallholder spice farmers’ income. Thus, the findings of this study are useful to smallholder farmers who practice certified organic, merely organic and inorganic spice farming. The objective of the study was to assess the contribution of spice farming to income of smallholder farmers.Specifically, the studyexamined practices of spice farming among smallholder farmers, assessed the farmers’ knowledge on the practice of organic spice farming, determined merely organic, certified and non-organic spice production and productivity and examined the contribution of merely organic spices; certified organic spices; and inorganic spices farming to income of the farmers.

2. methodology

The study was conducted in two districts of Zanzibar, the West and Central districts. The West District lies between 60.13'57'' latitude and 390.36'21'' longitudes at the elevation of 27.37 metres above the sea level and has an area of 208 km2. Central District which lies between 60.20’37’ latitude and 390.36’21’ longitudes at 23.2 metres above the sea level has a total area 453 km2. These districts have tropical climate, receiving an average annual rainfall of 1700mm. The majority of smallholder spice farmers are found in the two districts, due to their favorable climatic condition and good soil fertility for agriculture.

This study adopted a cross–sectional research design in collection of data from farmers practicing different spice farming practices. A total of five (5) shehia were randomly selected in each district. A total of 120 respondents were randomly selected. Out of 120 respondents/ households selected, 40 households were practicing merely organic spice farming, while 40 households practiced certified organic spice farming and 40 did not practice the two, but they were practicing inorganic spice farming. A questionnaire survey using a structured questionnaire formulated of open- and closed ended questions was used to collect the data. The in-depth approach was used to administer the questionnaire to the selected respondents. The data collected through the household questionnaire survey included practices of spice farming, types of spices, production of spices, and income from both non spice farming and other activities.

Both descriptive and inferential statistics were applied in analyzing the collected data. The inferential statistics were used for determining various factors to spice production and income. In addition, ANOVA was used to compare the production and contribution of the three types of spice farming.

A Liker scale analysis was done as follows: in the assessment of attitude of the spice farmers, seven statements were used. The scores were as follows: 5 = strongly agree, 4 = agree, 3 = undecided/neutral, 2 = disagree and 1 = strongly agree. These statements were part of the questions formed the questionnaire. In the analysis, several assumptions were made. In the assumptions, it was said that if all the respondents were to score 5 in each statement the total score would have been 35 (5 x 7); if they were to score 3, the total score would have been 21 (3x7) and otherwise all were to score 1 in each statement, the total score would have been 7 (1x7). Half of maximum score was 35/2 = 16.5. From the above assumptions the three levels were made as: 1 – 16 = low attitude; 17 – 21 = moderate; 22 – 35 = High (Chingonikaya and Salehe, 2018).

3. results and discussion

# 3.1 Smallholder Farmers’ Practices on Spices Farming

# 3.1.1 Types of spices grown

The findings show that farmers in the study area were observed to grow 10 types of spices (Table 1). Clove was grown by many farmers (65%), followed by black pepper (47.5%), vanilla (45%) and cinnamon (42.5%). The domination of cloves in types of spice cultivated in Zanzibar has a long history since during colonialism. Despite of Vanilla being cultivated by many farmers, its production was found to be low comparing to other types of spices. Spice farmers grow vanilla only for tourist purposes; the study found that majority of spice farmers grew at least one vanilla plant. Table 1 shows that among the least spice produce in Zanzibar; this is due to its cumbersome nature in growing as it needs hands pollination, good moisture supply mulching.

Table 1: Types of spice grown and production (n = 120)

|  |  |  |  |
| --- | --- | --- | --- |
| Type of spice | NO | Yes | Average Yield (kg/household) |
| Black Pepper | 52.5 | 47.5 | 251 |
| Nutmeg | 70 | 30 | 230 |
| Cardamom | 66.7 | 33.3 | 21 |
| Lemon grass | 61.7 | 38.3 | 28 |
| Cinnamon | 57.5 | 42.5 | 346 |
| Cloves | 35 | 65 | 394 |
| Vanilla | 55 | 45 | 16 |
| Turmeric | 94.2 | 5.8 | 54 |
| Ginger | 95.8 | 4.2 | 61 |
| Hot Chilly | 79.2 | 20.8 | 36 |

# 3, 1, 2 Technologies adopted in spice farming

The findings in Table 2 show that majority of farmers in the study (70%) adopted intercropping, while 68.3% adopted the use of organic fertilizer (68.3%) and 80% used mulching regardless of their engagement in certification processes. This made majority of spice farmers to practice organic spice by default. Only few farmers were using inorganic products such as fertilizers, pesticides and herbicides; these were mainly used at nursery stages of spice farming. These findings match with the study done by Gills et al. (2013) which showed that majority of farmers adopted conservation measures such as mulching and intercropping spice farming during the early stage of growth.

Table 2. Technologies adopted in spice farming in percentage (n = 120)

|  |  |  |
| --- | --- | --- |
| Practices  | Not Adopted | Adopted |
| Improved Seeds | 91.7 | 8.3 |
| Organic Fertilizer | 31.7 | 68.3 |
| Organic Pesticides | 67.5 | 32.5 |
| Inorganic Fertilizer | 76.7 | 23.3 |
| Inorganic Pesticides | 83.3 | 16.7 |
| Inorganic Herbicides | 97.5 | 2.5 |
| Crop Rotation | 53.3 | 46.7 |
| Intercropping | 30 | 70 |
| Terrace | 98.3 | 1.7 |
| Mulching | 20 | 80 |

Majority of participants of focus group discussions indicated that in relation to certification of organic spice, but not all crops were certified. They further indicated that only few with market potential spices were certified. The mentioned black pepper, cinnamon, nutmeg, vanilla, cardamom and lemongrass were certified. The participants of the FGDs, pointed out that there was only one buyer in Unguja who bought certified organic spices named *Ecoland* herbs and spices of Germany, even though there was only one buyer of certified spices but its demand had not been fully supplied.

# 3,2 Farmers’ knowledge on the Practice of Organic Spice Farming

From Table 3, the statement of “Use of manure, cultural diseases/infection control and soil conservation is the basis for organic farming” was strongly agreed by 40%, while those who strongly disagreed on of chemical fertilizers and industrial chemicals”, while very few farmers (2.5%) strongly disagreed the state accounted for only 2.5% of the farmers. This provides an impression that majority of the farmers have understanding that organic spice farming does not require any artificial chemicals. Majority of the farmers (34.2%) agreed on the statement that “An advantage of organic farming is the reduced use chemicals. This shows that many farmers have the knowledge of spice organic farming.

Table 3, further, shows that majority of the farmers (26.7%) were not in a position of agreeing or disagreeing on whether organic farming improves soil fertility or not. However, majority of the farmers strongly disagreed that “Economic income gains when practicing integrated farming are not convincing”. This could be interpreted that many farmers have understanding that organic farming leads to high income gains compared to inorganic spice farming. This argument is reported by various studies (e.g. Miyashita, 2015) that organic spice farming improves household income.

About 32% of the farmers strongly disagreed on the statement that the farm income may decrease when practicing organic farming as opposed by only 8.3% of the farmers who strongly disagreed on the statement. This shows that very few farmers have acknowledged the gains of the organic farming. Probably, these farmers had not practice organic farming. Table 3, further, shows that majority of the farmers (32.5%) had an opinion that farm income might decrease when practicing organic farming. Organic spice farming improves household income and export market favour more organic spices than inorganic ones were placed as strongly disagree by 33.3% and 33.5% of the farmers respectively.

**Table 3. Attitudes of farmers towards organic spice farming (n = 120)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | **5=Strongly Agree** | **4=Agree** | **3=Neutral** | **2=Disagree** | **1=Strongly disagree** |
| Use of manure, cultural diseases/infection control and soil conservation is the basis for organic farming | 481 (40.0)2 | 31 (25.8) | 26 (21.7) | 12 (10.0) | 3 (2.5) |
|  |  |  |  |  |  |
| An advantage of organic farming is the reduced use of chemical fertilizers and industrial chemicals | 36 (30.0) | 41 (34.2) | 31 (25.8) | 9 (7.5) | 3 (2.5) |
|  |  |  |  |  |  |
| Organic farmers improve soil fertility sustainably | 26 (21.7) | 29 (24.2) | 32 (26.7) | 28 (23.3) | 5 (4.2) |
|  |  |  |  |  |  |
| Economic income gains when practicing integrated farming are not convincing | 13 (10.8) | 20 (16.7) | 15 (12.5) | 34 (28.3) | 38 (31.7) |
|  |  |  |  |  |  |
| Farm income may decrease when practicing organic farming | 10 (8.3) | 16 (13.3) | 20 (16.7) | 35 (29.2) | 39 (32.5) |
|  |  |  |  |  |  |
| Organic spice farming improve household income | 13 (10.8) | 18 (15.0) | 19 (15.8) | 30 (25.0) | 40 (33.3) |
|  |  |  |  |  |  |
| Export market favor more organic spices than inorganic | 13 (10.8) | 19 (15.8) | 13 (10.8) | 36 (30.0) | 39 (32.5) |

1frequency 2percentage

The findings in Table 4 show that majority of the farmers (46.7%) had low knowledge about organic spices, while only 33.3% had moderate knowledge of organic spices and 20% of the farmers had the lowest knowledge. These results mean that even some of the farmers who had their spices did not have knowledge on organic spices. The situation of majority having low knowledge about organic spices means that spice farmers did not realize the premium benefit accrued from organic spices. Further, it can be due to certification of crops in Tanzania has been recently introduced.

**Table 4: Summary of levels of knowledge of the spice farming among farmers (n = 120)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Scores** | **Frequency** | **Percentage** | **Levels** |
| 22-35 | 47 | 33.3 | High |
| 17 – 21 | 20 | 20 | Moderate |
| 7 – 16 | 33 | 46.7 | Low |

**Organic, certified and non-organic spice production in kg/household per annual**

The study tried to determine production of spices based on the three types of farming namely merely organic, certified organic and non-organic spice farming. The results in Table 5 show that non organic spice farming had high production with an average of 174.3kg/household compared to others merely organic and certified organic spice farming types, which had the average of 86.3 kg/household and 70.2 kg/household respectively.

**Table 5: Spice production in kg/household per annual**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of spice** | **Merely organic** | **Certified organic** | **Non-organic**  | **Mean** |
| **Black Pepper**  | **128** | **80** | **250** | **152. 7** |
| **Nutmeg**  | **180** | **105** | **268** | **184.3** |
| **Cardamom** | **10** | **36** | **23** | **23.0** |
| **Lemon grass** | **12** | **18** | **36** | **22.0** |
| **Cinnamon**  | **167** | **150** | **345** | **220.7** |
| **Cloves**  | **156** | **123** | **467** | **248.7** |
| **Vanilla**  | **18** | **12** | **18** | **16.0** |
| **Turmeric**  | **68** | **49** | **102** | **73.0** |
| **Ginger**  | **78** | **103** | **156** | **112.3** |
| **Hot Chilly**  | **46** | **26** | **78** | **50.0** |
| **Overall** | **86.3** | **70.2** | **174.3** | **110.3** |

The production accord according to the types of the spice farming may be interpreted that inorganic type of farming still dominates and provides high yield among the farmers. A plausible reason may be the use of inorganic fertilisers and herbicides respond quickly to the spice farming as opposed to merely organic and certified organic spice farming. In addition, merely organic farming requires intensive labour, which if, a household relies on family, could probably not afford to supply such labour (Overfield and Fleming, 2001). On the other hand, the certified organic spice farming has been recently introduced in Zanzibar and Tanzania in general (MKUZA, 2007; Miyashita, 2015), which is likely to be practiced by few farmers. These famers practising the certified farming might also be having difficulties in handling the practice. However, RGoZ (2009) gave prediction yield of the spices in Zanzibar, not quite different from the ones presented in this study. The only exception is that this study used yield per household, while RGoZ (2009) predicted in terms of yield in acreage.

In assessing variances production of types of spice farming a one way ANOVA were used whereby three objects (merely organic, certified organic and inorganic spice farming) was assessed; data collected were standardized by logn to meet the model demand on normality. There was a significant difference among then three types of the spice farming at p<0.05 (Table 8). The score of three groups accounted for F=7.43; p= .007. The actual differences in mean score between merely organic and certified organic spice farming show that there were quite minimum, but there were significant differences between the two types and inorganic spice farming.

**Table 6: Production variance for types of spice farming in kg/household (n =120)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Types of spice farming** | **Mean** | **F-value** | **P=value** |
| **Merely organic** | **112.3 ± 39.83** |  |  |
| **Certified organic** | **119.3 ± 16.16** |  |  |
| **In-organic** | **174.3± 56.04**  |  |  |
| **Overall**  | **110.0 ± 65.53** | **7.43** | **0.007** |

The effect size calculated using the *Beta* squared was 0.03129. Post-hoc comparison using the Turkey test indicated that the mean score for group 1 (merely organic farming) (M=5.94, SD 1.74) and group 2 (certified organic farming) (M=5.86, SD=1.3) was significantly differed from group 3 (M=6.55, SD=2.08). However, there is no significance difference between group 1 and 2. The increased production by those certified their spices might be a result of close extension services from NGOs/certification companies as it was reported by Negera (2015) that producers who get extension contact increase amount of spice supplied to the market. Since certified organic spice farmers in Zanzibar are getting close supervision from various NGOs and Companies dealing with certified organic spices are likely to get more production than those who do not get extension services or those with minimal extension services.

**3.3 Factors influencing organic spice farming**

A multiple regression was done to assess factors influencing level of knowledge on certification of organic spices (Table 7). Nine variables entered in a model, these include farm size, government extension workers visits, district name, occasional training from spice farming supporters, household age, spice farming support, NGOs/company visit/advice on spice farming. The model shows three variables to be significant to certification of spice farming, these variables are district name, NGOs/company visit/ advice of spice farming and farm size (p< .05). organizations as determinant of certification organic spice farming probably due to the fact that majority of the organizations for organic spice farming are working in West District of Zanzibar since it is in town and easily accessible. Farmers who work with these NGOs/companies are likely to get trainings of certification of organic spice farming.

These findings are in line with those reported by Oluwatusin and Adesakin (2017) that there is positive significant relationship between extension services and adoption of technology. However, other studies indicate that adoption of technologies by farmers is being influenced by availability of land, premium market price of the products and labour (Kinyangi, 2014; Miyashita, 2015).

**Table 7: Factors influencing organic spices production**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Variables | Unstandardized Coefficients | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B |
| B | Std. Error | Beta | Lower Bound | Upper Bound |
| (Constant) | 21.780 | 4.125 |  | 5.280 | .000 | 13.606 | 29.954 |
| **District Name** | **-3.277** | **1.410** | **-.174** | **-2.325** | **.022** | **-6.070** | **-.483** |
| Age of Household Head | .037 | .071 | .044 | .519 | .604 | -.103 | .177 |
| Sex of the Household Head | 1.211 | 1.953 | .048 | .620 | .536 | -2.659 | 5.080 |
| Household size | .027 | .516 | .004 | .052 | .958 | -.995 | 1.049 |
| Spice Farming Support | -1.042 | 2.158 | -.041 | -.483 | .630 | -5.317 | 3.234 |
| Occasional Training from Supporters | 1.763 | 1.629 | .092 | 1.083 | .281 | -1.464 | 4.991 |
| Extension Workers Visit in 2015/2016 Cropping Season | 1.547 | 1.925 | .061 | .804 | .423 | -2.267 | 5.362 |
| **Organizations’ advice about Spice Farming** | **7.320** | **2.304** | **.284** | **3.177** | **.002** | **2.754** | **11.886** |
| **Farm Size** | **3.171** | **.723** | **.383** | **4.384** | **.000** | **1.738** | **4.605** |

R=0.448 and R squire= 0.403

# 3.4 Contribution of spice farming to income of the farmers

The study analyses the contribution of spice farming to household’s income. Table 8, Table 9 and Table 10 present the income accrued by the farmers from spice production in the three types of the spice farming, income from other sources and contribution of the spice farming to household’s income in percentage respectively.

**Table 8: Average of household’s income (TAS) received from spice farming per annum (n = 120)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of spice** | **Merely organic** | **Certified organic** | **Non-organic**  | **Mean** |
| Black Pepper  | 680 000 | 800 000 | 700 000 | 726 666.67 |
| Nutmeg  | 480 000 | 500 000 | 360 000 | 446 666.67 |
| Cardamom | 36 700 | 460 000 | 250 000 | 248 900.00 |
| Lemon grass | 55 000 | 80000 | 40 000 | 58 333.33 |
| Cinnamon  | 850 000 | 1 300 000 | 650 000 | 933 333.33 |
| Cloves  | 1 200 000 | 1 600 000 | 900 000 | 1 233 333.33 |
| Vanilla  | 60 000 | 120 000 | 60 000 | 80 000.00 |
| Turmeric  | 80 000 | 150 000 | 70 000 | 100 000.00 |
| Ginger  | 130 000 | 600 000 | 450 000 | 393 333.33 |
| Hot Chilly  | 40 000 | 49 000 | 25 000 | 38 000.00 |
| **Overall** | **361 170** | **565 900** | **350 500** | **425 856.67** |

On average, spice farmers in the study gained about 425 856 TAS from spice farming. Out of which 361 170 TAS, 565 900 TAS and 350 500 TAS gained from merely organic, certified organic and inorganic spice farming respectively. Table 9 indicates that spice farmers in the study gained about 1 200 000 TAS, 1, 592 666 TAS and 1 491 666 TAS in the categories of merely organic, certified organic and non-organic spice farming respectively. Table 10, furthers shows that the overall income received by the spice farmers from other sources was 1 427 777 TAS.

**Table 9: Average household income (TAS) received from other main sources (n = 120)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Main source** | **Merely organic** | **Certified organic** | **Non-organic** | **Overall**  |
| Crop sales | 450 000 | 750 000 | 800 000 | 666 667 |
| Salaried | 1 500 000 | 2 500 000 | 3 500 000 | 2 500 000 |
| Business | 4 000 000 | 5 000 000 | 3 500 000 | 4 166 667 |
| Remittances | 350 000 | 600 000 | 500 000 | 483 333 |
| Livestock sales | 300 000 | 400 000 | 250 000 | 316 667 |
| Pension | 600 000 | 300 000 | 400 000 | 433 333 |
| **Overall**  | **1 200 000** | **1 591 667**  | **1 491 667** | **1 427 778** |

In general, spice farming contributed to about 23%, 26% and 19% of the overall income of the households of the farmers under the respective categories of merely organic, certified organic and non-organic spice farming (Table 10). Table 10, further shows that the overall contribution of spice farming to household’s income accounted for 23%.

**Table 10. Percentage of contribution of spice farming to household’s income**

|  |  |
| --- | --- |
| **Type of spice farming** | **Percentage contributed to total income** |
| **Merely organic**  | **23.1** |
| **Certified organic** | **26.2** |
| **Non – organic** | **19.0** |
| **Overall** | **23.0** |

In assessing variances on contribution of each type of spice farming to household income a one way ANOVA was used whereby three objects’ (merely organic, certified spice organic and inorganic) annual income was assessed; data collected were standardized by logn to meet the model demand on normality. There was a significance difference at p< .05 in a score of three groups (F=6.72, p= .002). Despite reaching statistical difference in mean score between groups was quite small. The actual differences in mean score among groups show that they were relatively minor. The effect size calculated using the eta squared was 0.18. Post-hoc comparison using the Turkey test indicated that the mean score for group 1 (merely organic) (M=15.82, SD 1.3977) and group 2 (certified organic) (M=16.05, SD=0.4189) did not significantly differ; however there was a significant different between group 3 (inorganic) (M=16.295, SD=1.041) and other groups 1 and 2 (merely organic and certified) (Table 11).

The variation in income generated from the types of spice farming was minimal because during the holy month of Ramadhan season, the price of spice at local market becomes much high to reach the premium price of certified organic spices. But generally certified organic spice receive premium price at whole time. This study matches with that one conducted by Ayuya *et al*. (2015) in Kenya which found that certified producers were less likely to be multidimensional poor compared to their counterfactual case of not participating in organic certification schemes. The similar results were obtained by Parvathi and Waibel (2016) in their study conducted to black pepper smallholder certified farmers in India. Their findings show that certification systems have a significant impact on income compared to conventional black pepper farming.

Table 11: ANOVA for contribution of types of spice to household income (n = 120)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Types** | **Mean** | **Std. Deviation** | **Std. Error** | **F-value** | **P-value** |
| **Merely Organic** | **23.3** | **0.42** | **0.09** |  |  |
| **Cert Organic** | **26.2** | **0.94** | **0.19** |  |  |
| **Inorganic** | **19.0** | **1.39** | **0.34** |  |  |
| **Total** | **23.0** | **1.04** | **0.13** | **6.72** | **0.002** |

# 4. Conclusions and Recommendations

The general objective of the study was to determine contribution of organic spice farming to income of smallholder spice farming households in West and Central Districts of Zanzibar. The focus was on understanding contribution made by each spice farming category (merely organic, inorganic and certified organic spice farming. However, the study had specified four objectives on: (i) practices of spice farming among smallholder farmers; (ii) farmers’ knowledge on the practice of organic spice farming; (iii) merely organic, certified and non-organic spice production and productivity and (iv) the contribution of merely organic spices; certified organic spices; and inorganic spices farming to income of the farmers.

From the study findings, it can be concluded that many farmers grow clove, black peppers and cinnamon, despite there are various types of spices grown in the study area. Based on the same order, yield is declining accordingly. The spice farmers are also adopting various technologies including both organic and inorganic fertilizers and herbicides. Some spice farmers are observed receiving supports from various institutions, however many farmers do not receive any support. From this conclusion, the study recommends that in order to improve all the three types of spice farming (merely organic, certified and inorganic), farmers have to be provided with support from the government particularly extension services.

The study, also, concludes that many spice farming farmers had very little knowledge on the certified spice farming and its market. Based on the conclusion on the knowledge of the farmers on certified organic spice farming as a whole, there is a need of increasing sensitization programmes of the practices, marketing, and general importance of the spice farming so as to improve yields and wellbeing of the farmers.

According to the findings of the study, inorganic spice farming gives high yields compared to others. The certified organic spice farming gives very low yield. This provides an indication that the certified organic spice farming is being practiced in small areas. This requires much emphasis to be put in promoting the certified spice farming among the farmers in the study area as well as other areas in the country including Tanzania main land.

The study provides an interesting finding that despite the certified organic spices gives low yield, it has given high income contribution to households. Based on the importance of the certified spices giving high contribution to household’s income, there is a need of up scaling the practice through increasing sensitisation programmes.

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