

Production and Marketing Constraints of Major Sub-Tropical Fruits in Jimma Zone, South West Ethiopia

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Abstract: Fruit productions, particularly, sub-tropical fruits have been playing a significant role in the local economy as a means of earning livelihoods for millions of farmers, creating jobs and generating foreign currency in Ethiopia. Jimma zone which is found in Southwest of Ethiopia is potential in fruits production; mainly avocado and mango are the dominant sub-tropical fruits in the zone. Jimma Agricultural Research Center with collaboration of some governmental and non-governmental organizations has popularized improved fruit technologies through different channels in the zone. However, currently, farmers are not benefited and production and productivity of the fruits are being decreasing from time to time and affecting national economy beyond the welfare of the producing community. This study was therefore attempted to assess the production and, marketing constraints of major tropical fruit such as avocado and mango in the zone. Multi stage sampling method and quantitative and qualitative data type has been employed for data collection. Accordingly, data was collected from 151 randomly selected avocado and mango producing households in the zone from three districts namely Sokoru, Gomma and Mana. Focus Group Discussion and Key Informant Interview were made to organize qualitative data type. The result showed that disease, insect pests, lack of improved fruit varieties, lack of extension services, and abortion of fruits due to early and late raining were the core production and productivity constraints of avocado and mango in Jimma zone. Besides, the market was dominated by informal market system such as producers sells to unlicensed brokers, traders or collectors and lack of institutional fruit market system such as cooperatives and unions. The policy measures derived from the results includes: generation of disease and insect tolerant varieties of avocado and mango, strengthening extension services, combating informal traders and licensing as well as empowering formal marketing system such as farmer's primary cooperatives.

Keywords: Jimma Zone, Sub-tropical fruits, Production and marketing, informal trades, disease and insect pests.

1. INTRODUCTION

In Ethiopia, fruit production has been dominated by tropical and sub-tropical fruits. The major economic importance fruits such as citrus, banana, grape, avocado, mango, papaya, pineapple, passion fruit, strawberry are all introduced to Ethiopia from other regions of the world through missionaries, diplomats, merchants, and native scholars and are mainly produced under small-scale farmers (Wudine *et al.*, 2018).

Fruit productions and exports play a significant role in the local economy as a means of earning livelihoods for nearly five millions farmers, creating jobs and generating foreign exchange revenues in Ethiopia. Around 1,353,665.184 hectares of land is under fruit crops in Ethiopia. Bananas contributed about 56.79% of the fruit crop area followed by Avocado and Mango that contributed 17.26 % and 14.72%, respectively. Nearly 7, 774, 630.93 quintals of fruits was produced in the country. Bananas, mangoes, avocado and papaya took up 63.49%, 13.50%, 10.47% and 6.99% of production, respectively (CSA, 2017). Domestic consumption of the fruits is high and minimum amount of the product is used for export purpose. Mango (*Mangifera indica* L.) and avocado (*Persea Americana* Miller.) are among the dominant fruit crops next to banana in terms of area coverage, total production and export value in Ethiopia (Mengesha *et al.*, 2019)

Also, the fruit crops sub-sector is one of the priority strategic sectors recognized by the government of Ethiopia for its potential for private sector investments and exports. Ethiopian government in its the Second Growth and Transformation

Plan (GTP II covering 2015-2020) provided a greater emphasis aimed at increasing production of fruit crops nearly by half. However, sustainability in fruit production becomes questionable as a result of different production constraints and disorganized marketing and value chain actors' coordination system (Nega *et al.*, 2016).

In 2016/2107 production season, the production of mango and avocados are contributing to 13.50%, and 10.47% of the national fruit production years, respectively, covering about 14.72% and 17.26 % of the harvested area of fruit crops in the country, respectively. South Nation and Nationalities (SNNPR), Oromiya, and Amhara regional states are the major growing areas of edible fruits in Ethiopia. These regions have the largest potential for production using rain-fed as well as very limited irrigated commercial farming systems (CSA, 2017).

The South Western part of Ethiopia is the key production belt for fruits. Avocado and Mango fruits are categorized under sub-tropical fruits and are mostly grown under small scale farmers in Jimma zone which is found under south west part of Ethiopia. There is no clear evidence on whether mango is land race or not to the zone, however, avocado was introduced in the zone by the effort of Jimma Agricultural Research Center and different government and non -governmental organizations. The research center took the varieties from Wondo genet and Hirna district of SNNPR and West Hararge zone respectively. Some studies suggest that avocado was introduced to both Wondo Genet and Hirna by missionaries from abroad in 1938 for the first time. Jimma Agricultural Research Center has been done intensive work in collaboration of different organizations and has contributed much in adaptation, distribution and popularization of the avocado to different districts of the zone with its full packages starting from 1968.

Even though the contribution of both avocado and mango is huge in the livelihoods of the households and value adding products in the zone, farmers are not benefited and production and productivity of the fruits are being decreasing from time to time and this is indirectly affecting national economy beyond the welfare of the producing community and there is no clear reasons studied so far. Marketing of the fruits in the zone is also a critical problem and no study done before in detecting the core problems in the market too. Based on this background this study was aimed to identify major production and marketing problems of mango and avocado in Jimma zone, south west Ethiopia.

2. METHODOLOGY

The study was conducted in Jimma zone in Oromia regional state of south west Ethiopia. Jimma town is 350 km far from the capital Addis Ababa in south west of the country. Jimma zone consists of 21 districts of which the three major tropical fruits producing districts namely Manna, Gomma and Sokoru have been selected purposively based on their potential mango and avocado production. From these districts nine kebeles were selected and smallholder farmers were randomly selected. Primary data was collected from 151 households using structured questionnaire. Qualitative data also collected using Focus Group Discussion (FGD) and Key Informants (KII). Moreover, secondary data was also collected from the three districts including Jimma zone horticultural office and different published and un -published documents. Descriptive statistics such as percentage, mean, standard deviation, tables, graphs and charts were used to analyze and describe the collected data.

3. RESULTS AND DISCUSSION

3.1. Characterization of Fruit Production in Jimma Zone

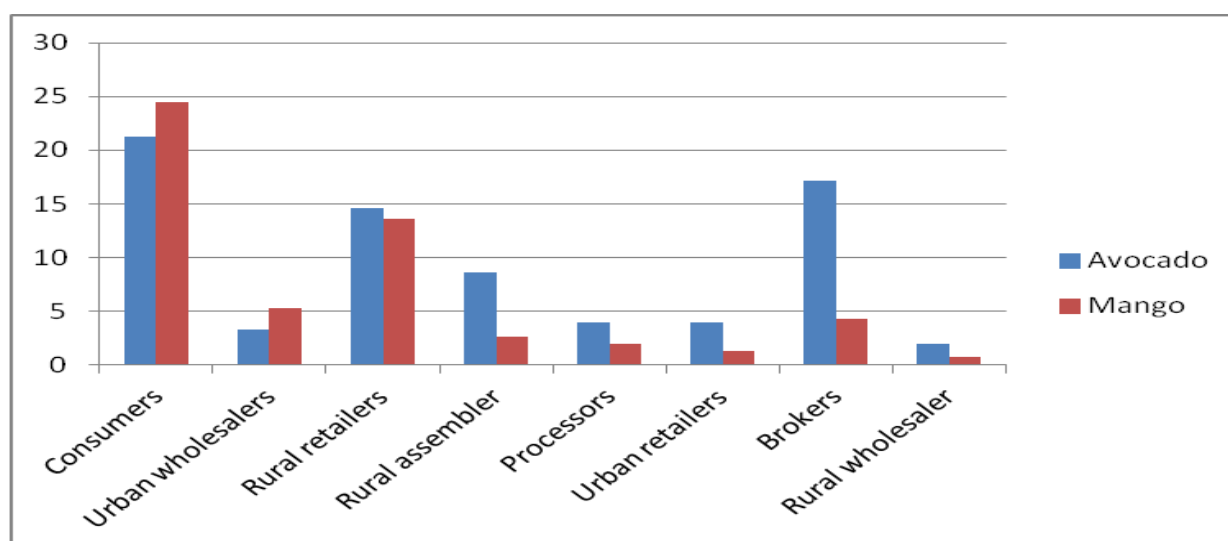
The major sources of income of the farmers in the study areas are coffee, maize, teff, tropical fruits and livestock. Tropical fruits such as papaya, banana, orange and pineapples are produced in the three districts. However, sub-tropical fruits, particularly mango and avocado are dominant in terms of production and area coverage in the zone. The result showed that on average a farmer has 10.67 avocado trees in number and from this 60% were bearing trees. Average avocado per tree production was 0.21ton while 0.11ton for mango. During the survey season immediately after harvest in the month of May, average selling price of avocado was 6.6 Ethiopian Birr per kilogram (1\$=30 ETB). On average a household consumed 8.24% of avocado from total production and sold 78.8% of the produced to buyers. The rest 11.96% was post harvest loss. This implies poor fruit consumption habits due to weak awareness on nutritional benefit of avocado and high post harvest loss due to disease and insect pest and poor post harvest management respectively. As a result majority of the households sold the fruit and use the income for other livelihood purposes. In other hand, average production of mango was 0.128 ton per tree which is less than average production of avocado obtained per tree. A household from a total Mango production consumed 11.85 % and sold 72.35 % of production. Post harvest loss of mango production in the study areas was 15.81% which is greater than avocado loss with similar causes for loss. (Table 1)

Table 1: Avocado and mango trees owned by households in four producing districts

Indicator	Mana		Gomma		Sokoru		Total	
	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Avocado								
Bearing tree number	9.28	17.08	3.47	3.72	5.760	12.75	6.40	11.48
Non bearing tree	7.76	13.93	1.81	1.72	5.54	6.956	5.08	9.40
Total trees	16.30	29.36	4.56	3.37	10.90	12.60	10.67	19.15
Production (q/tree)	2.590	1.717	1.44	1.31	2.159	7.0323	2.08	4.29
Average price(birr/kg)	4.743	3.98	4.78	5.09	6.0319	4.5269	6.60	4.43
Total consumed at home in quintal	1.410	1.70	0.99	1.56	0.994	1.1399	1.14	1.49
Total sold in quintal	11.09	13.48	3.21	4.91	5.76	12.80	9.72	29.88
Postharvest loss in %	7.80	13.50	12.76	22.10	15.80	25.376	11.96	20.82
Mango								
Bearing tree number	4.34	3.706	3.77	3.91	10.96	9.71	6.92	7.70
Non bearing tree	1.21	2.190	1.28	3.34	3.78	7.71	2.22	5.41
Total trees	4.74	3.66	4.37	4.399	14.14	13.68	8.24	10.18
Production (q/tree)	1.640	1.99	1.15	1.24	1.14	0.99	1.28	1.41
Average price(birr/kg)	7.05	4.211	5.50	3.05	6.71	4.33	6.28	4.08
Total consumed at home in quintal	0.969	1.032	1.05	1.28	1.11	1.11	1.05	1.15
Total sold at home in quintal	4.486	9.323	1.90	3.72	7.26	9.21	4.61	8.04
Postharvest loss in %	8.83	16.43	13.72	24.60	23.06	29.82	15.81	25.36

3.2. Main Buyers of Avocado and Mango Products

As shown in the figure (1) below four main avocado and mango fruit market outlets were identified in the study areas. Those include consumers, rural retailers, brokers, and rural assemblers/collectors. The share of avocado and mango market outlets was 21.2% and 24.5%, for consumers, 14.6% and 13.6% for rural retailers as well as the share of brokers was 17.2% and 4.3% respectively. This implies that dominance of informal market system in which producers sell to consumers directly or to unlicensed traders or retailers. In such a like cases, price is usually not set by the producer (seller) but by the buyer; this system is predominant in the avocado and mango fruit production system in the study areas according to the result of farmers' group discussion. The formal marketing system such as cooperatives and unions that receive fruit products from producers and channel to consumers, processors, supermarkets and retailers; does not exist in the study areas. Similarly, the involvement of private sector in collection, processing and marketing of tropical fruit products in the study areas does not exist.

**Fig.1. Main buyers of avocado and mango in main producing districts**

Village market is the main market where farmers sale their avocado and mango fruits in the zone. As shown in figure 2 below, 45.7% avocado and 42.4% mango fruits were sold by households at village market. Next to the village market they sold at farm gate. Households have not been sold avocado and mango products at district markets where possibly high price could be obtained. The price of the fruits at farm gate is too low where it's determined by the traders and no bargaining power for the producers. Similarly, according to the information obtained from focus group discussions, even if the farmer ship fruit products to Jimma town, no one purchase from him/her due to existence of a very strong agreement between agents and traders to extremely conceal market condition, particularly, price information for farmers. Further, there are no well structured chain streams and supporters of avocado and mango fruit value chains in the zone due to weak linkage among the fruits value actors.

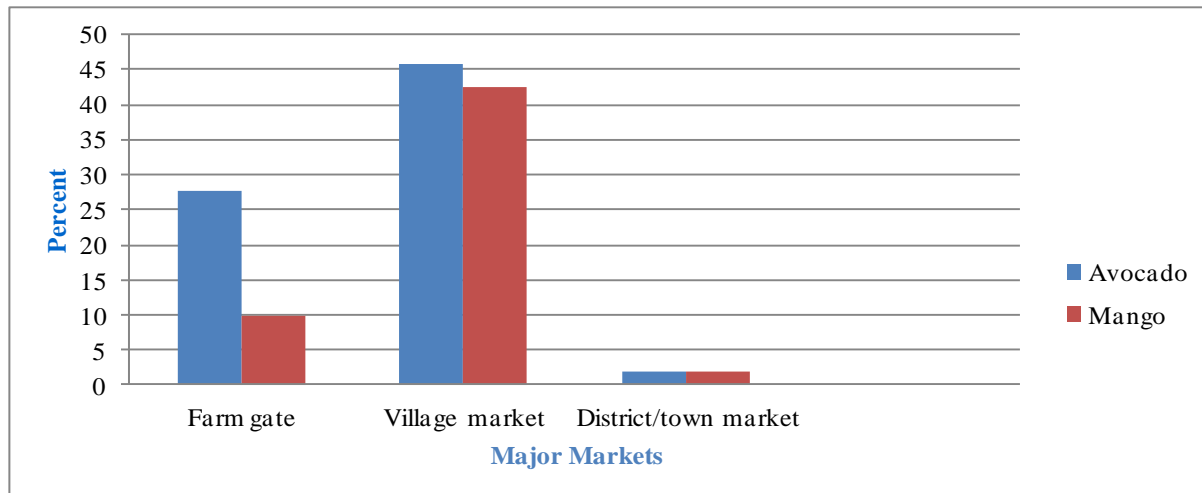


Fig. 2. Household's main market of mango and avocado in Jimma zone

Even though the contribution of the fruits is significant in their livelihood, production and productivity of both mango and avocado is decreasing from time to time due to different factors. The result showed that the main constraints of fruit production and productivity in the zone were disease and insect pests, lack of improved fruit varieties, lack of extension services, and abortion of fruits due to early and late raining. In figure 3 below, 75.5% of respondents in the study areas avocado were being affected by insect pests and 58.9% of the farmers reported that mango has been mostly affected by disease. Accordingly, white scale insect pest is a critical problem reducing mango production in the zone. It was a shock to be informed from zone and districts horticultural experts and farmers group discussion, that mango disease which has been happened since the last two years (2017) is becoming a critical issue which is beyond their control and they said that unless the government will take control measurement, the fruit will be extinct in future in the zone. There is also a problem of avocado wilt disease which needs the attention of all stakeholders to combat the disease in the zone. The study is consistent with work of Duressa (2018) that shows challenges of combating alien pests were among the major constraints seriously affecting the sustaining and accelerating production and productivity of mangoes in Oromiya, particularly western Oromiya and Asossa area.

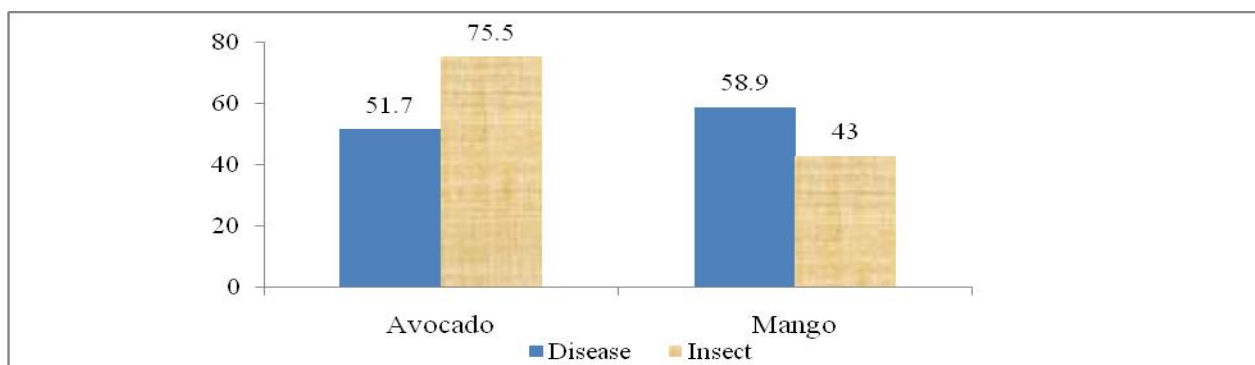


Fig.3. Farmers perception (%) of disease and insect pests of avocado and mango in Jimma Zone

Study result further revealed that there is no control measurement done so far by experts on diseases and insect pests that have been attacking fruit production in the zone. Traditionally, some farmers have been used smoke before harvesting to reduce fruit damage by insects. As shown in figure 4 below, 85% and more respondents did nothing to control both avocado disease and mango insect pests. Only 11.95 of the households used cultural method which is smoking to manage disease and insect pests' infestations. There are no improved/selective mango varieties to mitigate the problem of the disease in the areas. There is a weak government attention on the sub-sector which indicates there is very weak extension service for the fruits like other cereal crops.

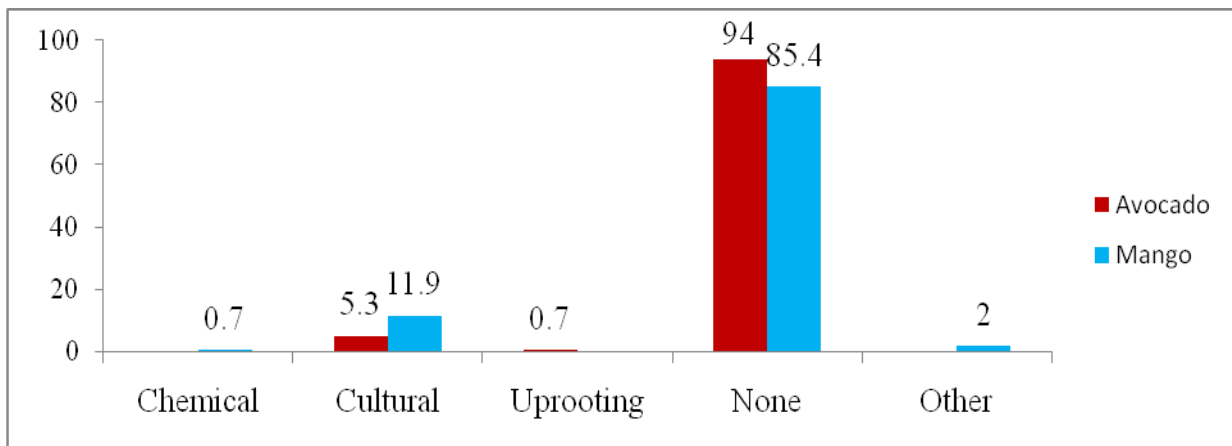


Fig. 4. Control method of insect pests and disease of mango and avocado

It is known that the nature of planting materials of fruits largely affect farmers fruit production and productivity. The planting materials that household use to plant and replace old fruit tree is mainly from seed/seedlings of the fruits. This is a good option to minimize the incidence of the insect pests and diseases in household's sub-tropical fruits farms. However, according to the study result, only 7.35 % of avocado and 2% of mango producing households have been planted new trees in the study areas that were obtained from farmer's own seed/seedlings. The impact of this result is that very less attention is given to the sub-sector by the government and any stakeholders in the zone and no extension service is given to the producing households (**Figure 5**).

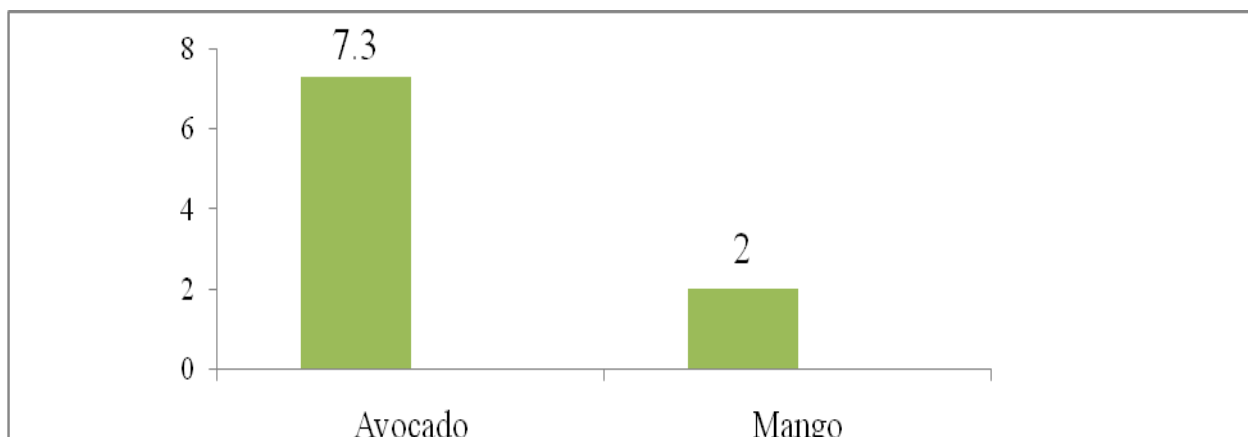


Fig.5. New plantations of fruits

Crop loss is the reduction of the crop yield, defined both in terms of quantity and quality that can occur in the field (pre-harvest) or in the storage (post-harvest) due to biotic or a biotic factor. A first step to crop-loss assessment is the quantification of yield losses, defined as the difference between attainable yield and actual yield (Loss, 1993). The result of the study depicted that tropical fruit product losses due to pests and diseases are a major threat to incomes and food security of the households in the zone. Accordingly, the result of the study revealed that 35.34 and 29.79 mean percentage of avocado fruit is lost due to diseases and insect pests respectively. Similarly, pre-harvest loss of mango is mainly due to insect pest's infestation which is 44.16% while loss due to disease is 28.08% on average (**Table 2**).

Table.2: Estimated yield loss of avocado & mango due to diseases and pests in the study area

Indicators	n	Min	Max	Mean	Std. Dv
Estimated yield loss (%) of avocado due to disease	71	0.00	100	35.34	24.82
Estimated yield loss (%) of avocado due to insect pests	34	0.00	100	29.79	26.81
Estimated yield loss (%) of mango due to disease	59	0.00	95	28.08	23.06
Estimated yield loss (%) of mango due to insect pests	88	0.00	100	44.16	27.68

The study further considered the source of information for farmers on management of insect pests and diseases of avocado and mangoes. As shown in table 3 below, 94.7% households have no any information regarding how to manage disease and insect pest of fruits. They have no any information access from governmental organizations such as public extension agents, research centers and media in the zone (**Table 3**). The result suggested the collaboration of government and non-governmental organizations as well as any stakeholders to aware the farmers on how to manage and protect their fruit's farm from insect pests and disease and will make the sub-sector useful in improving the livelihoods of the farmers and national economy.

Table .3: Source of information received on pest and disease management of tropical fruits

Source of information	Frequency	Percent
Agricultural extension agent	1	1.4
Research centers	1	0.7
Radio/TV	2	1.3
Others (specify)	3	2.0
Total	8	5.3
No source of information	143	94.7
Total	151	100

4. CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

Fruit production particularly, avocados and mangoes are the source of income for small scale farmers in Jimma zone and provides significant contribution to national economy. This study was initiated based on the current decline of the production, productivity and weak marketing system of the fruits in Jimma Zone. The study results identified production and marketing constraints of avocado and mango. Accordingly, the main avocado and mango production constraints in the study areas were disease and insect pests, lack of improved fruit varieties, lack of agricultural extension services, and abortion of fruits due to early and late raining. Phytophthora is a critical avocado disease highly affecting avocado farm of the farmers in the zone. Currently, mango is highly affected by white scale insect and even will be extinct if not control measurement is taken soon. Even though some control measurement such as varietal selection and proper agronomic practices has been done by researchers and horticultural experts of the zone, there is no possible solution to combat the disease from the farmers' field. Besides, the study result revealed that avocado and mango marketing system in the zone is distorted and farmers have not been gaining fair share of market margin from their products. Accordingly, informal market system in which producers sells to consumers directly or to unlicensed traders or retailers, post harvest loss and absence of formal fruit marketing system such as cooperatives and unions are among the identified marketing problems in the zone.

4.2. Recommendations

- It is suggested that stakeholders in fruit value chain needs to collaborate to combat the diseases and insect pests affecting fruit production in the zone.
- Agricultural research institutions need to develop disease tolerant varieties of mango and avocado.
- It is suggested to create awareness on cultural practice of disease and insect control methods. Moreover, training on proper use agronomic practices of the fruits is suggested since it minimizes the effect of the diseases.

- Use of irrigation is also a solution for the irregularity of rain fall. Immediate attention is needed for mango since the disease is beyond the control of the farmers and experts. Beyond national policy, international support is also needed on providing production inputs.
- Strong political remedy action is needed on marketing system of fruits in the zone particularly for avocado. The marketing of avocado in the zone is distorted where managing the market chain is beyond the measures taken by marketing and horticultural experts of the zone. During the key informant interview made with horticultural experts of the zone, they said even if they had facilitated market access for farmers being with market experts of the zone, they were challenged much with unlicensed traders in zone so that they fear to take corrective measure.

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