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## Spice production and marketing in Kaffa Biosphere Reserve, Ethiopia

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### ABSTRACT

Ethiopia has favorable climate conditions for the production of spices, herbs, aromatic and medicinal plants useful for flavoring food, aroma, therapeutic and marketing for cash income. Ethiopian is the largest consumer of spices in Africa, but the contribution of spice to the national economy is meager. The study area is endowed with diversified spice types with different purposes. However, it is not well announced, attention is not given and still many spices are growing in the wild. However, it is not well announced, attention is not given, and many spices are still collected from the wild. This study aimed to assess spice production and marketing in Kaffa biosphere reserve. This study was undertaken in four districts of Kaffa zone including Tello, Gimbo, Shishoende and Decha districts by selecting one representative kebele from each district. The data collection method used for this study is a household survey, key informant interviews and focus group discussion. Out of the total sampled 89% of sampled households participate and produce diversified types of spice. Korarima, red pepper, rue, ginger, turmeric, bush tea, holey basil, machewolago, aemacho nechamacho, coriander, rosemary, onion, long pepper and lemon grass were identified at the household survey. About 60.9% of the sample households provide spice products to market and the sample households generate a mean income of 1,611.14 ETB from spice product marketing. Most sampled households ranked themselves at low and very low knowledge levels on spice production and marketing. Spices are mainly produced in the home garden area for consumption. The main challenges for spice production in the study area are the unavailability of improved variety, low attention given by government and stakeholders, unavailability of the market, lack of knowledge and skill on production and post-harvest handling, low-value addition practice and unavailability of recommended practice. Creating a market for spice products and promotion is needed its importance and give attention to spice production. Training is needed for the farming community on spice cultivation, management, post-harvest handling and processing.

**Keywords:** Spice, Kaffa, Production, Marketing

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## Introduction

Ethiopia has very favorable agro-ecology and climate conditions for cultivation of spices, herbs, aromatic and medicinal plants which are very useful for food flavoring, therapeutic and marketing for cash income generation (Hordofa *et al.*, 2020). Spice is the basic food item in the diet of Ethiopian and its utilization history is ancient (Deribe, 2022). Spice is found in many forms as a dried or row seed, fruit, root, bark or vegetative and utilized in small quantities as a

food additive for seasoning and killing bacteria (Yimer, 2010; FAO, 2005). When compared to African countries, Ethiopia is the largest consumer of spices and its people utilize them to flavour bread, butter, meat, soups, and vegetables and to make medicines and perfumes (Goshme and Ayele, 2019). Even though the country is conducive to spice cultivation, its contribution to the national economy is very low less than 1% (Asfaw, 2020).



Ethiopia is the place of origin for Korarima (*Aframomum corrorima*), long pepper, Black cumin, white cumin /Bishop weed, coriander and ginger (Deribe, 2022). The country produces more than 50 types of spices from 109 spices, herbs and aromatic plants shortlisted by International Organizations for Standardization (ISO), out of which 23 are trading as export items. Ginger, turmeric, cumin, rosemary, cardamom, capsicum, fenugreek, coriander, korarima, long pepper, black pepper, hot pepper, rue, celery and thyme are majorly produced in Ethiopia (EIC, 2016). Smallholders in Ethiopia produce Korarima (*Aframomum corrorima*), red pepper, ginger, rue, turmeric, cardamom, black pepper, black cumin, white cumin /Bishops weed, coriander, fenugreek, sage, and cinnamon. However, korarima (*Aframomum corrorima*), red pepper, ginger, turmeric, black cumin and cardamom are the six most important spices produced in Ethiopia (Asfaw, 2020). According to Goshme and Ayele (2019), long pepper, black cumin, bishop's weed, coriander, thyme and fenugreek are attached to Ethiopia as a center of origin or diversity.

The demand for spice products from domestic consumers and the international market is higher than those produced within the country. Many factors hindering spices production and productivity in Ethiopia, including unavailability of high-yielding varieties, inadequate research support, weak private sector role, weak stockholder linkage, lack of extension services, lack of technology, deforestation, traditional way of farming, low attention to government, displacement of spices by other crops, animal grazing, lack of proper pre and post-harvest handling practices (Deribe, 2022; Asfaw, 2020; Goshme and Ayele, 2019). Korarima production is declining in Gamo Gofa, Debub Omo and Kaffa zones due to the deforestation of natural forests of the area destruction of the plant's natural habitat (Zakir, 2018). Spice producers are facing many challenges in marketing spice products including capital constraints, low market price, poor market access and information, limited processing of spices, transportation problems, low government support, lack of adequate knowledge, price volatility, weak market research and promotion (Goshme and Ayele, 2019).

Southwest Ethiopia is rich in the diversity of spice having different functions. Still, many kinds of spices are collected from natural forests and others are cultivated in home gardens and alongside farmland. Kaffa zone is one of the spice biodiversity most affluent areas with suitable agroecology and climate conditions for different types of spice production (Mulatu and Gadisa, 2020). Many spices grown in the area have

multiple purposes, including consumption, income generation, medicinal, and cultural value. Spices are cultivated in the area in the home garden and alongside farmland, and others are collected from the wild with lower or without any management practice. There is a high potential for spice production in the area, but utilization and production are lower. Lower attention was given to the sub-sector by the government, local communities, and other supporters. The habit of spice product marketing is lower and resulted in a lower market-oriented production system in the study area. Also, this sub-sector is producing traditionally without agricultural technology support like production systems and improved varieties.

This study wants to indicate the diversity, production, and marketing of spices in the study area. It is necessary to determine the income households generated from spice production and marketing and also it is necessary to determine the spice potential, constraints and opportunities of smallholder producers of the study area.

### **General objective**

The overall aim of this study was to assess spice production and marketing in the Kaffa biosphere reserve, the southwest region of Ethiopia.

### **Specific objectives**

- To identify the major types of spices produced in the area
- To assess beneficiaries' skills in spice production and post-harvest handling
- To determine households' income from spice production and marketing

## **Methodology**

### **Description of the study area**

This study was conducted in the Kaffa zone of southwestern Ethiopia. It is located 465 km southwest of Addis Ababa, having 12 districts & 5 administrative cities. The total land area of the Kaffa zone was 10,602.7 square kilometers. Kaffa zone is known for its dense forest coverage and the agroecology is 70% mid-land, 20% highland and 10% lowland. Four representative districts Gimbo, Tello, Shishoende and Decha, were selected for this study. Gimbo district lies within 07°00'- 7°25' N Latitude and 35°55'- 36°37' E Longitude. Tega kebele was selected for this study; its altitude is 1840 masl. The topography of Kebele is characterized by plain land and slopping and rugged areas. The mean annual rainfall and temperature ranged from 1710 mm to 1892 mm and 18.1°C to 19.4°C, respectively. The major crops cultivated and grown in the area include Enset, coffee, maize and tea.

Shishoende is located at a distance of 56 km from Bonga and 556 km from Addis Ababa. Geographically it lies at 7° 20' N and 35° 86' E. The altitude ranged from 1350 to 2200 meter above sea level. Wareta kebele was selected for this study from 31 kebeles of the shishoende districts and its altitude was 1780m above sea level. The annual rainfall of the kebele ranged from 1400 to 2000 mm and rainfall shortage happened between December and March. Coffee and Enset-based farming systems are practiced in the kebele and Enset, coffee, maize and Teff are majorly cultivated in the area. The annual mean temperature of the kebele ranged from 18°C to 20°C.

Decha is one of the districts found in Kafa zone located 24 km from Bonga town. Geographically, it is located at a latitude of 07° 22' 34" N and a longitude of 20° 29' 89" E. The altitude of the district ranges from 1550 to 2000 masl. Its annual rainfall ranged from 1490 mm to 2195 mm and the average annual temperature ranged from 14.1°C to 21.95°C. Agro-climatically, 7% of the district is highland, 45% mid-highland and 48% are lowland. Modiyo gombora kebele was selected for this study and its altitude is about 1860 and some parts of the kebele were about >2000 masl. The total land area of Modiyo Gombora kebele was 3193 ha and the total population was 3008.

Tello district was another selected area for this study; it was about 42 km away from Bonga. Geographically it is located in latitude of 07° 28' 34" N and longitude of 22° 20' 89" E. Yama kebele was selected for this study and it is located 37 km away from Bonga. The total area of the kebele was 788.64 ha. The altitude of the Kebele ranged from 2050 to 2100 meter above sea level. The mean annual temperature of the kebele ranged from 14°C to 17.5°C. The mean annual rainfall of kebele ranged from 1400-1900 mm. The major crops cultivated in the study area include enset, maize, coffee, bean, wheat, barley and teff.

### **Sampling design and sample size determination**

A multiple-stage sampling technique was employed and Kafa zone was the selected study area. In the first stage, four districts i.e. Tello, Shishoende, Decha and Gimbo were selected purposely from project intervention districts at Kafa zone. In the second stage, from each district one representative kebele was selected purposely by farming system, agroecology and other variables. In the third stage sample households were selected by simple random sampling method. Households were interviewed by

structured household survey questionnaire. To validate the household survey, key informant interviews and four focus group discussions were organized in each of the sampled kebele.

The sample size for this study was determined by Yamane's (1967) formula with a precision level of 7.5%. A total of 164 households were randomly selected and interviewed with a structured questionnaire from 2116 households of the four sample kebeles selected above and taken proportional to the number of total households of that kebele.

$$n = \frac{N}{1 + N(e)^2}$$

Where 'n' is the sample size; 'N' is the total number of households of the four kebeles and 'e' is the level of precision (error level).

### **Data type, source and collection technique**

Quantitative and qualitative data were collected from primary and secondary sources for this study. Primary data were collected through key informant interviews and focus group discussions by semi-structured questionnaires and household surveys using structured questionnaires. Key informant interviews conducted at Woreda and kebele levels that have better knowledge of spice production and marketing. A focus group discussion was performed in all four kebeles of four districts by including elders, females, youth, development agents and kebele administrators who have better knowledge of the issue and about the area. The members of the focus group discussion range from 13 to 30 persons. Household surveys conducted in all four Kebeles with different sizes were taken from each Kebele.

Primary data were about the socio-economic characteristics of households, type of spice cultivated, production system and importance of spice, marketing and income from spice sold. Secondary data were collected from reports of the respective district and Kebele office, published and unpublished materials, and internet and website reports.

### **Method of data analysis**

The main analytical method used to indicate the results was descriptive statistics. The sample respondents' demographic and socio-economic conditions, type of spice produced and marketed and knowledge of spice producers are analyzed using descriptive statistics like mean, standard deviations, frequency and percentage using the SPSS version 23 package. The results of the analysis were indicated by table, chart, graph and descriptions.



## Results and Discussion

### *Socio-economic characteristics of the sample household*

Out of the sample households, 91.5% were male and 8.5% were female. No one is single, 91.5% are married, 2.7% are divorced and 58% are widowed. The mean age of the sample household head was 44.7 years and ranged from 21-63 years. The average family size was 6 members with a minimum of 2 and a maximum of 13 family members. The education status of the sample households was assessed. Out of the sample households, 41.35% did not join formal education, while 42.5% joined primary school, 14.25% joined secondary school and 1.9% joined college.

The land holdings of the sample household ranged from 0.125 to 6.0 hectares with a mean of 1.577 hectares and all of the sample households have land. The average land holding of the sample households is smaller for mixed farming households due to many plots of land being covered by permanent crops and some are allocated for grazing. Different sizes of land were allocated for different purposes. The mean size of land allocated for homestead is 0.335 ha; for woodlot is 0.118; for grazing is 0.205 and for spice production is 0.104 ha. with a share of

21.2%, 7.5%, 51.7%, 13.0% and 6.6% of the average land holding of households, respectively.

### *Livelihood income sources*

Households in the study area depend on diversified income sources. The main livelihood activities conducted by the sample households include crop production, livestock rearing, forest product collection, spice production and off-farm activities. This finding showed that crop production, livestock rearing and spice production ranked 1, 2 and 3 of the main income sources for households in the area. Households in the study area generate a minimum of 5,000 ETB and a maximum of 190,000 ETB with a mean of 49,748.53 ETB total annual incomes from all livelihood activities. The variation of total annual income, crop income, livestock income and spice income between Kebeles are statistically significant; households in Yama and Tega kebele generate higher than households in Modiyo gombera and Wareta kebele. The sample households generate a minimum of 4000 ETB and a maximum of 150,000 ETB with a mean of 32,829.27 ETB from crop production, contributing 65.99% of the household's annual income (Table 1). It is the major source of income for households in the area.

Table 1. The mean incomes of sample households from different sources.

Income sources	Total sample Mean	Share (%)	Yama	Modiyo gombera	Tega	Wareta	Sig.
Crop production	32,829.27	65.99	36954.5	23,500.0	47,437.5	27083.3	0.075
Livestock rearing	12,945.12	26.02	19750.0	10825.0	9,343.78	10875.0	0.019
Forest resource	891.06	1.80	1229.3	635.4	607.2	416.6	0.131
Off-farm	1,471.95	2.96	3054.5	850.0	406.0	1250.0	0.393
Spice production	1,611.14	3.24	4011.6	1097.1	957.2	841.7	0.008
Total income	49,748.53		65,000.0	36,907.5	58751.7	40,466.6	0.032

Livestock rearing is the secondary contributor to the annual income of the sample households since it shares 26.02% (Fig. 1) and generates an average income of 12,945.12 ETB with a maximum of 50,000 ETB and a minimum of 0 ETB. Households in the study area generate a mean income of 891.06 ETB from forest resources with a minimum of 0 ETB and a maximum of 6,250 ETB and forest resources

contribute 1.8% of annual household income in the study area. On the other hand, sample households generate a mean income of 1,471.95 ETB from off-farm income sources, which is 2.96% of the sample household's annual income. Spice production contributes a mean income of 1,611.14 ETB with a minimum of 0 ETB and a maximum of 25,000 ETB, which is 3.24% of households' annual income.

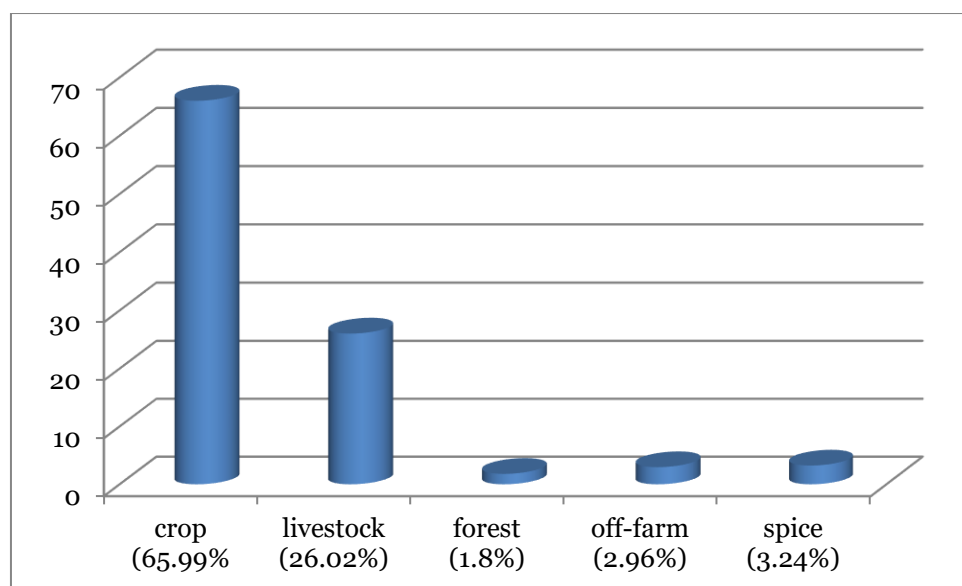


Fig. 1. Income of the sample households from different sources.

### Spice production

The results from focus group discussions, key informant interviews and household surveys confirmed that the availability of numerous spice types and the study area have high potential for spice production. Out of the sampled households, 89% cultivate spice and 11% do not participate in spice cultivation. The engagement of households in spice production varies from kebele to kebele. The results of the household survey indicate that, out of the sample households 95% of Yama kebele, 85% of Modiyo gombora kebele, and 87% of Tega and Wareta kebeles are engaged in spice production. The results show that the largest household engagement was recorded in Yama Kebele and the lowest in Modiyo Gombora Kebele.

During focus group discussion and key informant interview 18 major types of spices produced in the study area are identified, which include Korarima (*Aframomum corrorima*), red pepper, ginger, rue, bush tea, turmeric, holey basil, black cumin, coriander, rosemary, onion, long pepper, lemon grass, Machewolago (*Foeniculum vulgare*), Aemacho (*Artemisia afra*), Nechamacho, Shukindo (*Artemisia abyssinica*), Aedicho (*Verbena officinalis*) and Nechedicho (*Aeollanthus densiflorus*). However, the availability of diversified spice types at the household level was very limited. Black cumin, Shukindo (*Artemisia abyssinica*), Aedicho (*Verbena officinalis*) and Nechedicho (*Aeollanthus densiflorus*) were not found during the household survey.

Korarima (*Aframomum corrorima*), red pepper, ginger, turmeric, rue, bush tea, holey basil, Machewolago (*Foeniculum vulgare*), Aemacho (*Artemisia afra*), Nechamacho, coriander, rosemary, onion, long pepper and lemon grass

were identified during the household survey. The results were in line with the findings in West Shoa and south wollo, Ethiopia that diversified spice types produced in smallholder's home gardens (Zuberi *et al.*, 2014; Tesfa *et al.*, 2017). Results from household surveys indicate that about 76.2% cultivate less than five types of spice and only 23.8% cultivate 5 and above types of spice in their home garden, alongside farmland and in the forest. The commonly produced spices identified in all four kebele include holey basil, rue, korerima, bush tea, coriander, long pepper, Machiwolago, Aemacho and Nechamacho. Ginger and turmeric were only produced in Tega kebele, rosemary is produced by a small number of households in Wareta and Yama kebele. While onion and red pepper are only produced in Wareta kebele. Even korerima produced all the sample kebeles it is majorly produced in Yama kebele by allocating large land.

The average land allocated for spice production by the sample household was 0.104 ha. There is also a variation of land allocated for spice production between sample kebeles. The average size of land allocated by sample households in Yama kebele was 0.105 ha, Modiyo gombora kebele was 0.06 ha, Tega kebele was 0.103 ha and Wareta kebele was 0.04 ha. All those spices cultivated in the area are local varieties; no improved varieties are cultivated in each type of spices. The discussants and interviewer confirm that there is no one supporting governmental and non-governmental organizations or institutions for this spice production and marketing in the area.

Spices cultivated in the study area were utilized for home consumption as an additive to food as condiments, aroma, medicine, cleaning material and others. The findings are in line with the findings in South Wollo, Ethiopia that the

majority of spices produced are used for home consumption and the excess products are provided to market (Tesfa *et al.*, 2017). Limited types of spices are sold in the market for cash income generation, which includes *korerima*, long pepper, ginger, turmeric, rue, holey basil, onion, red pepper and bush tea. *Korerima* and long pepper are sold in the market at the market price per kilogram. However, other spices are quantified by estimation and prices are settled by negotiation and the sellers are price takers and hardly negotiate the price due to fear of post-harvest loss in case the product is not sold.

Value addition practices like sorting, cleaning, drying and storing are done to long pepper and *korerima*, while other types of spices and spice products were sold as fresh without processing and value addition practices. Limited spice seedlings were sold in the area, including ginger,

turmeric, onion and red pepper. Rue, bush tea, holey basil and rosemary products sold in the market were also used as seedlings if bought the fresh product. Husbands and other male family members participate in cultivating *korerima*, long pepper, ginger and turmeric by planting, weeding, managing and proving to market. While wife and other female family members cultivate bush tea, rosemary, holey basil, coriander, lemon grass, rue, red pepper, *aemacho*, *nechimacho*, *machewelago*, ginger, turmeric, onion, and others, which mainly grow in the home garden. Gender role in spice cultivation and marketing is in line with the finding in South Wollo, Ethiopia (Tesfa *et al.*, 2017). Spice produced in the study area has many purposes. Some spices are used for medicinal, condiment, aroma and cash income generation by selling and some others are used for all purposes.

Table 2. List of spices produced in the area with their purpose.

No.	Purpose of production	List of spices
1	Condiment, aroma, consumption	<i>Korerima</i> , onion, red pepper, <i>besobila</i> , <i>koseret</i> , ginger, turmeric, rue, <i>dimbilal</i> , <i>kodo</i> , <i>shukindo</i> , <i>tibis kitel</i> , <i>teji-sar</i> ,
2	Medicinal plant	Rue, <i>aemacho</i> , <i>nechimacho</i> , <i>maciwolago</i> , <i>aedicho</i> , <i>nechidicho</i> , <i>dimbilal</i>
3	Marketing	<i>Korerima</i> , onion, red pepper, <i>besobila</i> , long pepper, rue, ginger, turmeric, <i>dimbilal</i>

The discussants confirmed that the trend of spice production and its diversity in the home gardens of farming households are decreasing. The majority 68.3% of sample households said that the trend of spice production in the study area was decreasing, 14.6% said there was no change and 17.1% said that it was increasing. The main reasons raised by the interviewer and discussant for the decrement in the trend of spice production were giving less attention than staple food crops, marketable crops and cereal crops; less knowledge/ awareness on spice uses, market unavailability, less demand in quantity, unavailability of supporting bodies, land shortage, and unsuitability of climate condition in some area for some spices.

### Marketing of spice product

The provision of spice products to the market is a crucial way to generate cash income and diversify sources of income. About 60.9% of the sample households provide spice products to market while 39.1% do not participate in spice marketing. In the study area, the participation of households in the marketing of spice products varies from place to place. In the sample kebeles, 91%, 60%, 56% and 38% of Yama, Modiyo, Tega and Wareta, respectively, participate in the selling of spice products. Most households from Yama kebele participate in the spice product market and households from Wareta kebele are the least participants. *Korerima* is the main marketable and in most households, the only marketed spice in the study area. The average

income from spice marketing is about 1,611.14 ETB with a minimum of 0 birr and a maximum of 25,000 ETB. The mean income of the sample households from selling spice also varies from kebele to kebele. Households in Yama kebele generate the highest average income and while households in Wareta kebele generate the lowest income from spice selling. The mean income of the sample households of Yama, Modiyo, Tega and Wareta are 2,540.90 ETB, 1,732.5 ETB, 1,564.37 ETB and 1,258.30 ETB, respectively. The availability of market infrastructure in the residence affects spice production and marketing. From the sample households, 64.6% have a market within 5 km and 35.4% do not have a market within 5 km of their residence.

### Knowledge of households on spice production to market engagement

The sample households were asked to evaluate their knowledge of spice production, collection, handling, processing, market engagement, buyer and storage by ranking their knowledge as very low, low, medium, high and very high. The interview result indicates that most sampled households ranked themselves at low and very low knowledge levels on spice production and marketing. This indicates that households in the study area have no adequate knowledge to produce in large quantities and frequently. So training is needed for households in the study area on how to cultivate, manage process, handle, store, and provide spices products to market.





Plate 1. Major spices produced in the area of Kaffa Biosphere Reserve, Ethiopia.

Table 3. Knowledge of sample households on spice production to marketing.

No.	Evaluation criteria of the producer's knowledge	Very low (%)	Low (%)	Moderate (%)	High (%)	Very high (%)
1	How to cultivate, manage and utilization	20.7	26.5	32.9	13.5	6.4
2	How to collect, handle, dry and store spice	34.1	32.9	21.8	11.2	0.0
3	Buyer of your spice product	31.5	42.6	18.3	5.2	2.4
4	Buyer preference	36.6	51.2	11.0	1.2	0.0
5	Production to market engagement	33.4	34.2	22.6	7.5	2.3



### **Major spices produced in the area**

The major and frequently available spices identified in the study area at the household level are korerima, rue, bush tea and holey basil.

#### **A. Korerima**

Korerima is produced by 69.5% of the sample households with an average experience of 4.6 years. There is a variation in the engagement of households in korerima production from kebele to kebele. Out of the sample households 91% of Yama, 75% of Modiyoa gombera, 69% of Tega and 46% of Wareta kebele are engaged in korerima production. The average lands allocated for korerima production were 0.0987 hectare or 0.79 *timad*, which is less than the finding of [Mulatu and Gadisa \(2020\)](#). Their result shows that households in the study area allocate 0.25 ha for korerima production. It is majorly produced alongside farmland by selecting farmlands unsuitable for other cultivation. It is mainly cultivated for income generation as a cash source, out of the sample households 47.4% were cultivated for cash income generation purposes, 17.5% were cultivated for consumption at home, as a condiment and 35.1% were cultivated for both market and consumption at home. The main economic part of korerima was its row seed, which is considered a highly important spice in the study area. The main person responsible for korerima production was the male family member next to the husband. The value addition practiced on korerima products identified includes sorting, clearing, clipping together by fiber, hanging, drying and smoking. According to the result of the household survey, the productivity of korerima in the study area was 63.59 kg per 0.125 ha or 508.76 kg per hectare. Even if households produce with lower amount and land allocated is less, it is the potential spice in the area, as reported by [Mulatu and Gadisa \(2020\)](#). indicated that the area has a high potential for korerima production with an average productivity of 400 kg per hectare. Income from selling korerima covers 96.2% of households' average income from spice marketing.

#### **B. Bush tea/ koseret**

Bush tea is another potential spice in the study area, cultivated by 65.9% of the sample households. There is a variation in the participation of households in koseret production from kebele to kebele, 77% of Yama, 35% of Modiyoa gombera, 75% of Tega and 75% of Wareta kebele participate in koseret production. The majority 96.5% were cultivating for home consumption and only 3.5% were cultivating for both consumption and market. Income from the marketing of koseret was very low due to the amount provided to the market being small and its market price being very low. It is mainly

cultivated for its good aroma and for cleaning milk storage. Due to its bush nature, covering a wide area and small quantity needed for consumption, only 1 to 3 plants were cultivated per household. All of the interviewed producers are cultivating on home garden and its leaf was the economic part of the plant. Female family members were responsible for managing bush tea and nothing value addition or processing was taken to provide it to market due to its fresh leaf being chosen by buyers.

#### **C. Rosmary/ tibis kitel**

Rosemary is a rarely cultivated spice, only 8.5% of the sample households produce it. It is not much adopted in the area and rarely produced for home consumption. 1 to 3 plants were cultivated by the producer. It is produced only in Yama and Wareta kebele by a small number of households. The main responsible persons for its management were female family members. It is cultivated in a home garden and no significant land is allocated for its cultivation.

#### **D. Holey basil/ besobila**

Holey basil is cultivated by the majority 73.2% of the sample households. There is a variation in the participation of households in holey basil production from kebele to kebele, 91% of Yama, 60% of Modiyoa gombera, 56% of Tega and 79% of Wareta kebele of the sample households produce holey basil. Two types of holey basil were cultivated in the study area, *Kefo* (*Ocimum basilicum* var. *basilicum*) and *Diro* (*Ocimum basilicum* var. *thyrsiflorum*) by local language. It is mainly cultivated for consumption or household usage as a condiment for food. It is also cultivated in a small quantity of 5 to 10 plants per household and no significant part of land was allocated for its cultivation due to its usage in small quantity. The economic part of holey basil was its leaf and seed. Female family members were responsible for its management by cultivating around the home. Nothing value addition is practiced before selling and those seeds sold are used as seedling preparation for the buyers.

#### **E. Rue /Tenadam**

Rue is another spice cultivated by 78% of the sample households, due to its importance as medicinal value, ingredient for coffee and as a condiment. It is also mainly cultivated for household consumption; only 4.7% is produced for consumption and marketing. It is cultivated in the home garden and female family members were responsible for weeding, planting and management of this spice. Only 1 to 3 plants were cultivated per household due to their consumption needs were smaller. Its leaf and seed were the economic part sold at market and no value addition was practiced during marketing.

### Challenges of spice production and marketing

The main challenges raised by interviewers and discussants for spice production and marketing are the unavailability of improved high-yielding and disease-resistant variety, unavailability of recommended improved practices, low attention given by government and stockholders, unavailability of well-designed product market center, lack of knowledge and skill on production and post-harvest handling, low-value addition practice, wildlife attack, especially for korerima, poor extension support, displacement by Enset and coffee, some spice are unknown by majority and land shortage. The challenges in the area are in line with the review of Goshme and Ayele (2019). On the other hand, the main challenges in marketing spices were price volatility, demand fluctuation, the distance of the market, market unavailability, transportation problems, low price and buyer's interest in fresh products.

### Conclusion

The study area has a high potential for spice production and diversified spice types produced in the study area, but the availability of diversified spice types at the household level was lower. Eighteen types of spices were identified in focus group discussions and key informant interviews, but only 16 types were found during the household survey. Korerima, rue, bush tea and holey basil are the majority and frequently available spices in household home gardens and alongside farmland. Households do not much benefit from spice production due to the unavailability of the market, low price, low demand, small quantity needed, lack of improved varieties, inadequate knowledge and skill on post-harvest handling and processing, low attention of government, many spices used for the medicinal purpose are not well known by the vast majority, transportation facility problem and others. The main focus of spice producers was for home consumption purposes either as condiment or aroma and medicinal, however generating cash income by providing to market was lower and only korerima is the majorly marketed spice in the area. Government and other stockholders should give attention to this sub-sector by promoting diversified production. Capacity building is crucial for spice producers in cultivation, management, post-harvest handling, processing and creating markets. Some spices found only in limited households have special importance; they need conservation practices to maintain their existence.

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