European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.9, No.10, 2017

Constraints and Opportunities of Coffee Production in Arsi Zone: The Case of Chole and Gololcha Districts

Jima Degaga (Corresponding Author[1])
Mechara Agricultural Research Center, PO box 19, Mechara, Ethiopia

Tadesse Melka (Corresponding Author[2])
Mechara Agricultural Research Center, P.O. Box 19, Mechara, Ethiopia

Birhanu Angasu (Corresponding Author[3])
Mechara Agricultural Research Center, P.O. Box 19, Mechara, Ethiopia

Gosa Alemu (Corresponding Author[4])
Mechara Agricultural Research Center, P.O. Box 19, Mechara, Ethiopia

Asfaw Zewdu (Co-author)
Mechara Agricultural Research Center, P.O. Box 19, Mechara, Ethiopia

Mohammedsani Amin (Co-author)
Mechara Agricultural Research Center, P.O. Box 19, Mechara, Ethiopia

Abstract
The study has been conducted in two coffee producing districts (i.e., Gololcha and Chole) of Arsi zone with objectives of assessing constraints and opportunities of coffee production. A multistage sampling technique was applied for this study. Total sample size of 119 households was interviewed and generated both qualitative and quantitative data on constraints and opportunities of coffee production. Descriptive statistics such as mean, standard deviation, frequency distribution and percentage, and an index score were used to analyze data. The study indicated that lack of improved coffee varieties recommended for the study area, diseases, pest, drought and low price were among major constraints of coffee production in the study area. However, construction of rural road, proximate to Mechara Agricultural Research Center and availability of coffee plantation enterprise in the area were among major opportunities for coffee production. The study indicated that developing of improved coffee varieties, enhancing extension services to improve farmers' skill and knowledge on coffee production system, improving coffee marketing condition, and enhancing infrastructural and institutional facilities were among important factors to improve coffee production and productivity, and thereby improving livelihoods of coffee producers in the study area.
Keywords: Coffee landrace, coffee shade, coffee diseases and insect-pest, low price, market access

1. Introduction

1.1. Background and Justification

Ethiopia is the origin of Coffee Arabica and the largest producer of coffee in Africa and the largest fifth coffee producer in the world (GAIN, 2014). Coffee production is vital to Ethiopian economy with about 15 million people directly or indirectly deriving their livelihoods from it. Coffee accounted for 19% of total Ethiopian export (Trading Economics, 2016). The area allocated for coffee production in 2015/16 Meher Season was 653,909.76 ha which was About 4.69% of the area under all crops in the country and 4,145,964.55 quintal was produced with average yield of 6.34 quintal/ha (CSA, 2016). In 2014/15 Meher Season, the area allocated for coffee production was estimated to be 561,761.82 ha from which about 4,199,801.56 quintal was obtained with average yield of 7.48 quintal/ha. Even though the area allocated has increased by about 92147 ha or 16.40%, yield obtained was decreased by 53837.01quintals or 1.28% and average yield of quintal per hectare also was decreased by 15.20% due to inadequate amount of rainfall in the country in 2015/16 production year.

Coffee production in Ethiopia is constrained by lack of competitiveness, poor access to market, lack of infrastructure, in adequate access to services, low value addition, and in adequate technology transfer and research (Jose, 2012). Another constraints of coffee production in Ethiopia is limited extension and research facilities (World Bank, 2015). This is a key constraint that worsens the impact of risks such as pest and diseases outbreak. Coffee trees can be left more vulnerable to outbreak of pests and diseases when a lack of effective extension results in weaker agricultural practices. In recent days, *khat*, a plant chewed by humans for its stimulating effect, is competing for farm land with coffee (GAIN, 2014, and Tolera and Gebermedin, 2015). Some small holder coffee farmers resorted to producing *khat* instead of coffee as they are increasingly attracted by the high prices and greater yield they get from cultivation of *khat*. A significant number of farmers

particularly in the eastern part of the country have switched from coffee production to *khat* production. *Khat* is drought, diseases and pest resistant plant which can be harvested three to four times a year and generates better income for farmers than other cash crops including coffee.

The Ethiopian coffee sector has bright prospects (Jose, 2012). The country has suitable altitude, optimum temperature, low labor costs and fertile soil. It can sustainably produce and supply fine specialty coffee with potential of producing all coffee types of the various world coffee growing origins. Another opportunities of coffee production in Ethiopia are; high national and international demand for the product, increasing interest of private sector with high investment potential, high support by both regional and federal governments (Berhanu, 2017). The Ethiopian Coffee and Tea Development and Marketing Authority has been re-established as per the proclamation endorsed by the House of Peoples' Representatives on December 2015, with a view to boosting the country's benefit from the sector (Zelalem, 2016). The Authority has mandates and responsibilities; to strengthen modern extension services to attain higher level of production and increased productivity, to establish quality based effective and efficient marketing systems, and to support, supervise and regulating of coffee processing industries.

In Oromia National Regional State, 417,557.38 ha of land was allocated and 2,586,654.70 quintal was produced with average yield of 6.19 quintal/ha in 2015/16 Meher Season (CSA, 2016). From top 25 coffee producing districts in Ethiopia, Oromia dominates with 18 coffee producing districts and the remaining top coffee producing districts are located in SNNP (*James et al*., 2015).

Arsi Zone is one of the Oromia region's zones which has potential of coffee production. In 2015/16 Meher season, 6,476.56 ha of land was allocated and 40,248.25 quintal was produced with average yield of 6.21quintal/ha (CSA, 2016). Coffee plantation enterprise is also found in Gololcha district which is one of the districts in the Arsi Zone. Gololcha district is 14th from top 25 coffee producing districts in Ethiopia and 7th from top 18 coffee producing districts in Oromia (*James et al.,* 2015). Therefore, assessing opportunities and constraints of coffee production was found to be vital in Arsi zone because it helps to develop appropriate technology and inform policy makers to understand the gap. So far, no works have been done to assess the opportunities and constraints of coffee production in the study area.

1.2. Objectives

The main objective of this study was:

- To identify constraints and opportunities of coffee production and marketing in Arsi zone.

2. Methodology

2.1. Description of the study area

The study was conducted in two coffee production potential districts of Arsi zone namely, Gololcha and Chole.

2.1.1. Golocha District

Gololcha is located at about 218 km from Addis Ababa, the capital city of Ethiopia and 206 km from Asella, which is the capital town of Arsi zone. It is bordered by Aseko district in the north, Amigna district in the south, Daro Lebu district in the east and Chole district in the west (GDOoANRM, 2015). The district found at an altitude ranging from 1400 and 2500 masl. Generally, the district has a total area of 178102 hectares and is classified in to two agro-ecologies, the midland and the lowland with a share of 25% and 75% respectively. The average temperature of the district is 35^0 c and the average rainfall is 900 mm/year. Total population of the district is estimated to be 201,247 out of which 102,502 were males and 98,745 were females. The main rainy season of the district is in April, May, June, July, August and September. The soil type of the district is silt soil and sandy soil. Major crops produced in the district are coffee, maize, sorghum, teff and groundnut.

2.1.2. Chole District

Chole district is located at 219 km to the east of Addis Ababa and 144 km from Asella, the capital of Arsi zone and found on an area of 68200 hectares. It is bordered by Guna district in north direction, Aminya and Sude districts in south direction, Gololcha district in east direction and Sude district in west direction (CDOoANRM, 2015). Out of the total land area of the district about 21,922 hectares is cultivated land whereas 1860 and 3500 hectares are forest land and grazing land, respectively. The minimum temperature of the district was 15^{0}c and maximum 25^{0}c with average rain fall of 1000mm/year. The main rainy season of the district is bimodal and first rainy season was from March to June and the second is from July to September. In terms of soil type, 35% is black soil, 55% is red, 8% is brown and 2% is sandy soil. The district is divided in to 3 (three) agro-ecologies, highland (48%), midland (18%) and lowland (22%). The major crops produced in the district were Wheat, Barley, Maize, Faba Been, Teff, Sorghum, Coffee and Chat.

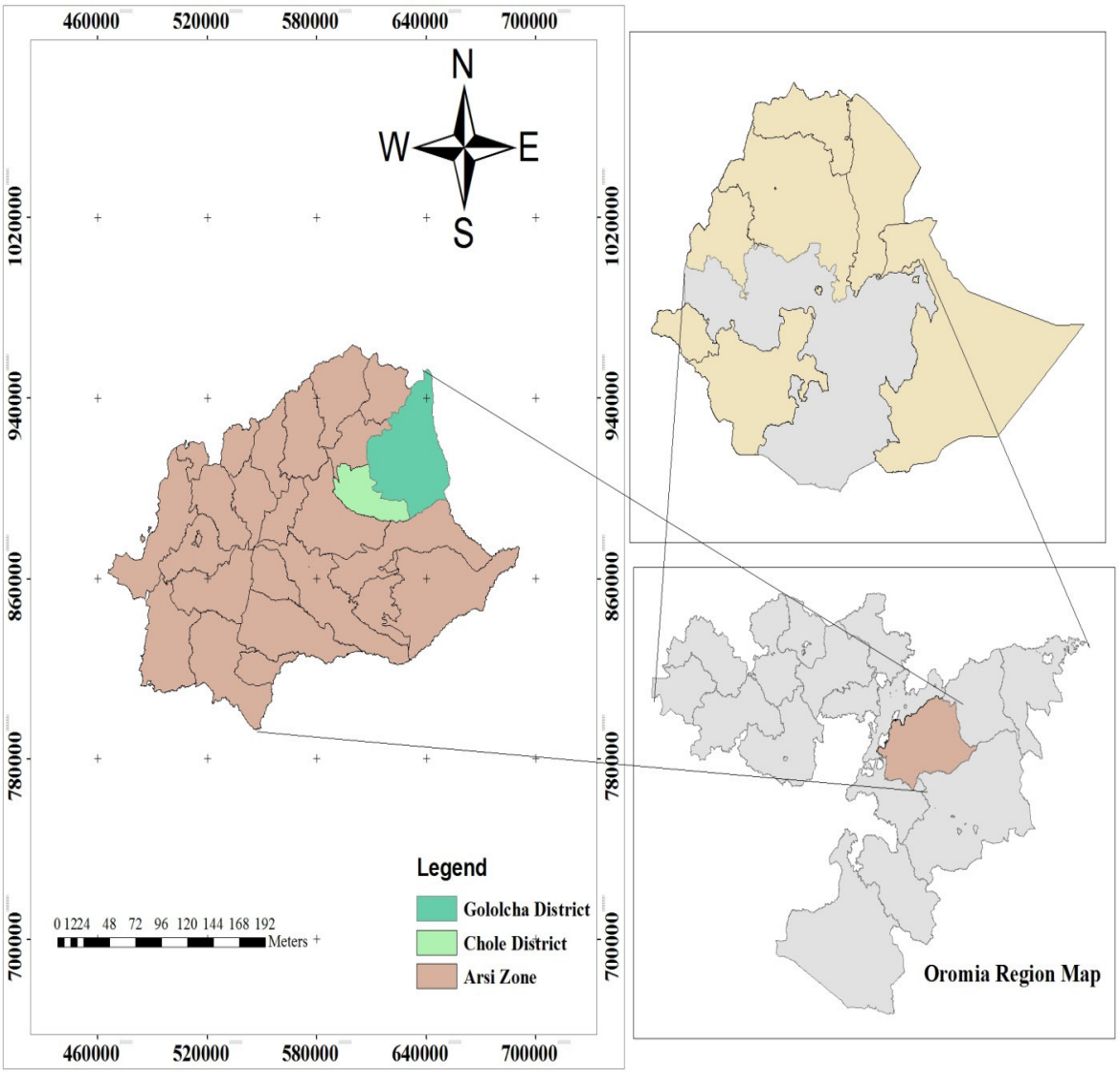

Figure 1: Political map of the study area.
Source: Own computation from GIS data, 2016

2.2. Sample Size and Sampling Technique

The study employed multi-stage sampling method. Districts and *kebeles* were selected purposively in collaboration with zonal and district agricultural and natural resource management office based on coffee production potential. Accordingly, Gololcha and Chole districts were selected. Then, two kebeles from each district (Jinga Bilu and Konto Gogeti from Gololcha District and Magna Oda Adi and Magna Werki Derartu from Chole district) were selected. Finally, 60 households from Gololcha district and 59 households from Chole district using proportional to population size and total of 119 households were selected from the zone by simple random sampling method.

2.3. Data Sources and Method of Data Collection

The study utilized both primary and secondary data sources. Primary data was collected from sample respondents by using structured interview schedule. A total of five enumerators were involved to conduct the survey. These enumerators were trained regarding the objectives of the study and particularly on the detailed contents of the questionnaire. The secondary data was also collected from unpublished documents of zonal and district agricultural and natural resource management offices.

2.4. Method of Data Analysis

The data was coded and entered in to SPSS version 20 software for statistical analysis and management. Descriptive statistics such as mean, standard deviation, frequency distribution and percentage were used to

understand socio-economic situation and constraints of coffee production. An index score was also calculated and used to provide overall ranking of major coffee diseases, pest, marketing constraints and density of permanent coffee shade on farmers' coffee field.

3. Results and Discussion

In this chapter, the results of the study along with previous research findings are briefly presented and discussed as follows.

3.1. Demographic and socio-economic characteristics of sampled households

Sex, education and marital status: Survey result indicated that 95.8 % of the respondents were males headed, while 4.2 % were females headed (Table 1). Education is very important factor which helps farmers to understand and implement the information received from any direction. Similarly, the study revealed that 72.3% of the sampled households were literate and the remaining 27.7% were illiterate. This indicated that majority of coffee producers in the study area are educated which in turn can help to boost production and productivity of coffee. The study also showed that 93.3%, 4.2%, 1.7% and 0.8 % of the respondents were married, unmarried, widowed and divorced, respectively.

Table 1. Sex, educational level and marital status of the sampled respondents.

Variables Categories		Frequency	Percent
Sex	Male	114	95.8
	Female	5	4.2
Education	Literate	86	72.3
	Illiterate	33	27.7
Marital status	Married	111	93.3
	Unmarried	5	4.2
	Divorced	1	0.8
	Widowed	2	1.7

Source: survey result, 2015

Age and family size: The mean age of the sampled respondents was 39.40 with the range between 16 and 70 years. This indicated that most of the respondents were found in economically active age group. The family size of the sampled households was ranged from 2 to 18 with mean and standard deviation of 7.96 and 3.13, respectively.

Table: 2 Age and family size of the sampled respondents

Variable	Minimum	Maximum	Mean	Std. Dev.
Age	16.00	70.00	39.40	11.06
Family size	2.00	18.00	7.96	3.13

Source: survey result, 2015

Land allocation of the sampled households: Land is the main factor of production needed by the households to make their livelihoods. The study indicated that average land holding size per household was 1.38 ha with standard deviation of 0.83, and with the minimum and maximum values of 0.25 ha and 4 ha, respectively. On average, 0.52 ha of land was allocated by sampled farmers for coffee production whereas, the land allocated for *chat* (*Khat edulis*) was 0.29 ha with minimum and maximum value of 0.03 ha and 1.25 ha, respectively. This indicated, the land allocated for coffee production exceeds the land allocated for *chat* production. However, according to farmers of the study area because of drought, diseases, pest and low price of coffee, it was being substituted by *chat*.

Table 3. Landholding size and their allocation status of the sampled households.

Variables	Minimum	Maximum	Mean	Std. Dev.
Total landholding size (ha)	0.25	4.00	1.38	0.83
Land allocated for coffee (ha)	0.09	3.00	0.52	0.40
Land allocated for chat (ha)	0.03	1.25	0.29	0.24

Source: survey result, 2015

Main occupation and major means of income generation: The survey result on Table 4 indicated that 55.5 % of respondents depended both on crop production and livestock rearing, 39.5 % on crop production only and 0.8 % on livestock raring only as their main occupations in the study area. Coffee was the major means of income generation for the majority of the respondent which was about 44.5 %.

Table 4. Main occupation and major means of income generation of the respondents.

	Variable	Frequency	Percent
Main occupation	Crop production only	47	39.5
	Livestock rearing only	1	0.8
	Both crop production and livestock rearing	66	55.5
Major means of income generation	Coffee production	53	44.5
	Cereal crops production	9	7.6
	Livestock rearing	3	2.5
	Chat	6	5.0

Source: survey result, 2015

Experience in coffee production and number of coffee mother trees owned: The table 5 revealed that the minimum and maximum years involved in coffee production by sampled respondents was 1 and 50 years and averagely, one household had 17.07 years' experience of coffee production with standard deviation of 8.36. This indicated that farmers of the study area had more experience of coffee production. The number of mother coffee trees owned was ranged from 50 to 3000 with mean 499.08 and standard deviation of 466.61.

Table 5. Experience in coffee production and number of coffee mother trees owned by respondents.

Variable	Minimum	Maximum	Mean	Std. Deviation
Years involved in coffee production	1	50	17.07	8.36
Number of coffee mother trees owned	50	3000	499.08	466.61

Source: survey result, 2015

3.2. Coffee Production and its agronomic practices in the area

From total sample households, 45.4% intercropped coffee with different annual crops such as Maize (69.8%), Sorghum (20.7%), Potato, Onion, Hot Pepper, Groundnut, Sweet Potato, Teff and Tomato were accounted for the remained percent. But, majority of the respondent (55.6%) produced Coffee solely.

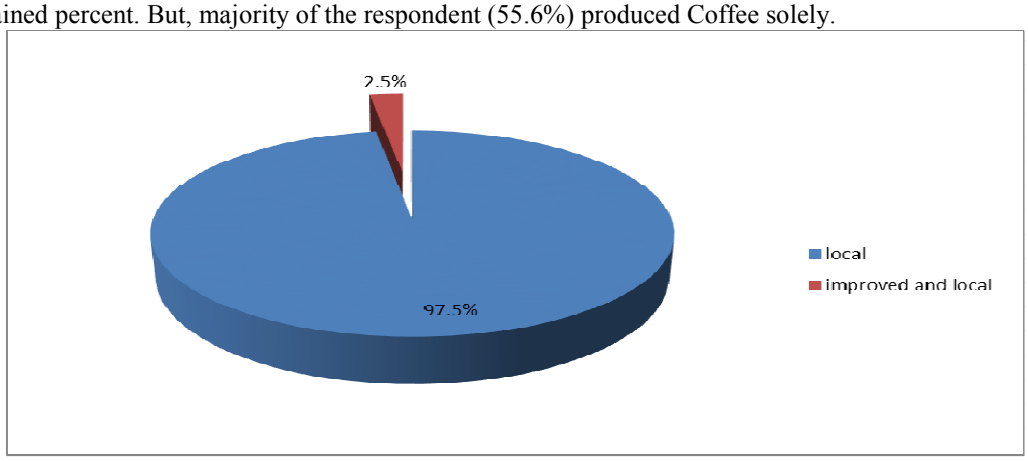

Figure1. Types of coffee varieties used for coffee production in Arsi Zone
Source: Own survey result, 2015

An increased access to improved quality seed is essential for farmers to enhance productivity (Girma, 2015). But, the study on figure 1 revealed that 97.5 % of the respondents used local coffee landraces which they inherited from their parents and only 2.5 % used both local and improved varieties which they took from agricultural and natural resource management office for coffee production. This indicated that the availability of improved varieties and extension services on coffee technologies were very low which has hindered coffee production and productivity in the study area. Similarly, studies conducted by GAIN (2014) argued that the major reason for low production of coffee in Ethiopia is inadequate use of improved seed technologies.

Local coffee landraces grown and preferred by farmers: Local coffee landraces produced in the study area were *Kubania, Abadir, Buna Guracha, Shumbure, Buna Dima, Tello* and *Manza*. Among those local coffee landraces, 56.9 % of the farmers in the study area preferred *Kubania* landrace because of high yielder, tolerant to CBD, BDB and CLR, large seed size, long life span and good taste relative to others. Next to *Kubania* landrace, *Buna Gurracha* was preferred. Because, it is drought tolerant, moderate yielder, uniformly matured and moderate resistant to diseases.

Table 6. Local coffee landraces grown and preferred by the farmers.

No.	Coffee Landraces	Frequency	Percentage
1	*Kubania*	58	56.9
2	*Abadir*	2	2.0
3	*Buna Guracha*	26	25.5
4	*Shumbure*	1	1.0
5	*Buna Dima*	3	2.9
6	*Tello*	2	2.0
7	*Manza*	8	7.8

Source: survey result, 2015

Procedure of preparing coffee seed for sowing: Recent study revealed that removing parchment and soaking coffee seed in water enhances emergence and subsequent growth of coffee seedling. In all parameters (leaf area, root volume, root dry weight, stem dry weight and total dry matter) clean coffee resulted in better performance over the parchment seed (Wosene *et al.,* 2010). However, 50.4% of the respondent transplanted coffee seedling which dropped from mother trees and grown under its beneath to seed bed and coffee field, and 12.2% of respondents sow coffee without removing its husk in the study area. On average, farmers stored coffee seed for 3.42 months before sowing and grow coffee seedling on the bare root.

Table 7. Procedure of preparing coffee seed for sowing practiced by farmers

Variable		Frequency	Percent
Procedure of preparing coffee seed for sowing	Collecting seedling grown under the beneath of coffee mother trees and transplant to prepared seed bed	58	50.4
	Selecting and collecting red cherries and drying with its husk	14	12.2
	Collecting red cherries, pulping and drying	39	33.9
	Selecting and collecting red cherries, pulping, soaking in water and drying	4	3.5

Source: survey result, 2015

Farmers practice on coffee shade: Temporary shade is important to protect coffee seedling from morning and afternoon sun injury and enhance its survival rate. Accordingly, 95% of the respondents have constructed temporary shade while 5% have not constructed (Table 8). The temporary shade constructed in the study area was "*Dasa"* which has been constructed from locally available grass, residual of different crops and leaves of locally available plants. Locally constructed grass hat (*Gojo*) gave best coffee seedling growth response and can be used in areas with shortage of ample soil moisture or rain (Addis *et al*, 2015) was in line with farmers practice of temporary shading in the study area. In terms of permanent shade, all famers' (100%) coffee field had permanent coffee shade and 83.2% was partially shaded which is preferred over fully shaded.

Table 8. Farmers practices on coffee shade in the study area.

Shade	Variable	Frequency	Percent
Temporary shade	Practiced	113	95.0
	Not practiced	6	5.0
	Total	119	100.0
Permanent shade	Practiced	119	100.0

Source: survey result, 2015

The permanent coffee shade available in the study area were Cordia africana, Acacia albida, Acacia seiberiana, Milletia ferruginia, Erthrina abyssinica, Ficus sycomorus, Ficus vasta, Croton macrostachyus, and Nimtrea. Their density on coffee farm was as follows;

Table 9. Index score of permanent coffee shade in terms of density on farmers' coffee field.

No.	Permanent coffee shade	Index score	Rank
1	*Cordia africana*	0.2765	1
2	*Erthrina abyssinica*	0.2233	2
3	*Acacia seiberiana*	0.2029	3
4	*Acacia albida*	0.1193	4
5	*Milletia ferruginia*	0.1008	5
6	*Ficus sycomorus*	0.0450	6
7	*Ficus vasta*	0.0234	7
8	*Croton macrostachyus*	0.0048	8
9	*Nimtrea*	0.0036	9

Source: own survey result, 2015.

Index for a particular Permanent coffee shade = sum of [9 for $Rank_1$+ 8 for $Rank_2$ + 7 for $Rank_3$+ 6 for $Rank_4$ + 5 for $Rank_{5+4}$ for $Rank_6$ + 3 for $Rank_7$ + 2 for $Rank_8$ + 1 for $Rank_9$] divided by sum of [9 for $Rank_1$ + 8 for $Rank_2$ + 7 for $Rank_3$+ 6 for $Rank_4$ + 5 for $Rank_{5+4}$ for $Rank_6$ + 3 for $Rank_7$ + 2 for $Rank_8$ + 1 for $Rank_9$] for all Permanent coffee shade.

According to farmers of the study area *Cordia africana* is not desirable coffee shade because of shallow rooted and hence adds up root thickness which will push up the root of coffee. In addition, *Cordia africana* competes for moisture and its leaf does not decomposed. Despite this, *Cordia africana* was the densest coffee shade in the study area because of other benefit such as being lumber. *Erthrina abyssinia* was second next to *Cordia africana* in terms of shade density on farmers' coffee field. *Erthrina abyssinica* is desirable permanent coffee shade. Because, it has deep and therefore, has low competition for moisture and does not push up root of coffee. This result is consistent with study conducted by Tadesse (2015) which indicates broad-leaved and deciduous trees are considered as undesirable for coffee shade unless there are no legumes or other desirable tree species are found in a plot.

Coffee mulching and pruning practices of the farmers: Farmers practiced mulching to conserve moisture and improve soil fertility. Majority of the respondent (64.7%) mulched their coffee field and 35.3% did not mulch (Table 10). Tree leaf, soil, grass and residual of different crops were major mulching materials used by the farmers. Pruning is also an essential management practice in coffee production. It helps to achieve the desired plant shape and contribute to sustainable higher yields (Tadesse, 2015). Nevertheless, only 21.8% of the respondents have practiced pruning, (53% stumping, 26.9% height management, desuckering and rejuvenation accounted for the remained percent).

Table 10. Coffee mulching and pruning practiced by sampled respondents.

		Frequency	Percent
Mulching	Practiced	77	64.7
	Not practiced	42	35.3
	Total	119	100.0
Pruning	Practiced	26	21.8
	Not practiced	93	78.2
	Total	119	100.0

Source: survey result, 2015

Organic and chemical fertilizers application: Ethiopian coffee farmers and traders arguable claim that their coffee is organic (GAIN, 2014). The result of the study was also in line with the report. Table 11 revealed that 92.4% of respondents have applied organic fertilizers in coffee field. Among organic fertilizers, 90.9% applied manure, 4.5% applied compost and 4.5% of them applied both manure and compost. A recent survey reported that only 2% of smallholder farmers apply chemical fertilizers in Ethiopia (as cited in Tadesse, 2015). The study indicated that 11.8% of the total respondents have applied chemical fertilizers and 88.2% did not apply chemical fertilizers. Even though smallholder farmer's application of chemical fertilizers was very low in the study area, it was above national average. Coffee produced in the area was more organic coffee which is in line with Ministry of Agriculture and Natural Resource Management which does not encourage the application of chemical fertilizers (GAIN, 2014). All family members (husband, wife and children) have been participating in fertilizer application.

Table 11. Organic and chemical fertilizers application practiced by respondents.

Type of fertilizers	Variable	Frequency	Percent
Organic fertilizers	Applied	110	92.4
	Did not apply	9	7.6
	Total	119	100.0
Chemical fertilizers	Applied	14	11.8
	Did not apply	105	88.2
	Total	119	100.0

Source: survey result, 2015

3.3. Constraints of coffee production and marketing in the study area

3.3.1. Institutional factors

Access to market information and training: Recent survey recommended that to improve the performance of coffee marketing and the livelihood of coffee producers, enhancing institutional facilities such as market information are very important (Getachew, 2011). The result on Table 12 indicates that 61.3% of the respondent in the study area had access to market information. Their major source of market information were radio, neighbor, mobile, agricultural cooperative, developmental agents and own assessment of market. Training is also very important to capacitate farmers' skill and knowledge on coffee production. Accordingly, 65.5% of the

respondents have received training and advisory services while 34.5% of the respondent did not receive training and advisory services (Table 12). Training providers were developmental agents and district agricultural and natural resource management office, and types of training mostly received were about agronomy, pre and post-harvest management and drying and storing mechanisms. This indicated that majority of the respondent have received training. Yet, coffee farm management system and agronomic practices of famers in the study area were traditional.

Table 12. Access to market information and training

Variables		Frequency	Percent
Market information	Have access	73	61.3
	Not have access	46	38.7
Training and advisory services	Received	78	65.5
	Not received	41	34.5
	Total	119	100.0

Source: survey result, 2015

ECX (Ethiopian Commodity Exchange) is a public market facilitating institution that was established in 2008 within the help of USAID (GAIN, 2014). The main reason for establishing ECX was to illuminate the huge number of middlemen involved in coffee distribution and to enable coffee farmers to benefit from prevailing market prices. However, only 10.1% of respondents knew the purpose of EXC and no perceived benefit from this institution. They sold dried cherries to local trader (because of no having other alternatives) at 25.12 prices on average which even cannot cover their cost of production (Table13). There was also transport problem and no storage facilities.

Table 13. Coffee marketing constraints ranked by respondents.

Coffee marketing constraints	Index score	Rank
Low price	0.3150	1
Market access problem	0.2256	2
Market information problem	0.1661	3
Transport problem	0.1659	4
Storage problem	0.1274	5

Source: Own survey result, 2015.

Index for a particular coffee marketing constraint = sum of [5 for $Rank_1$ + 4 for $Rank_2$ + 3 for $Rank_3$ + 2 for $Rank_4$ + 1 for $Rank_5$] divided by sum of [5 for $Rank_1$ + 4 for $Rank_2$ + 3 for $Rank_3$ + 2 for $Rank_4$ + 1 for $Rank_5$] for all coffee marketing constraints.

3.3.2. Diseases and insect-pest

Major coffee diseases in the study area: In our country, the most economically important pathogenic coffee diseases are coffee berry disease, coffee wilt disease and coffee leaf rust, and physiological disorder like coffee branch die back is caused by pseudomonas syringe and non-pathogenic agents. Similarly, coffee berry disease and branch dieback were causing high yield loss of coffee production (Table 14). They could not control these diseases and were losing high yield unless improved coffee varieties will be extended in the area.

Table 14. Major coffee diseases ranked by the sampled respondents.

No.	Diseases	Index score	Rank
1	Branch Die Back (physiological disorder)	0.3636	1
2	Coffee Berry Diseases	0.3288	2
3	Coffee Wilt Diseases	0.1985	3
4	Coffee Leaf Rust	0.1009	4
5	Almillaria Root Rot	0.0085	5

Source: Own survey result, 2015

Index for a particular coffee Diseases = sum of [5 for $Rank_1$ + 4 for $Rank_2$ + 3 for $Rank_3$ + 2 for $Rank_4$ + 1 for $Rank_5$] divided by sum of [5 for $Rank_1$ + 4 for $Rank_2$ + 3 for $Rank_3$ + 2 for $Rank_4$ + 1 for $Rank_5$] for all coffee Diseases.

Major coffee insect-pest: Insect-pests are considered to limit coffee production in both quality and quantity (Million, 1987). In Ethiopia, over 47 species of insect-pests are recorded on coffee (Crowe and Tadesse, 1984). Among which Antestia bug, *Antestiopsis intricate* and Coffee blotch miner, *Leucoptera caffeina* are the major ones inflicting considerable damage. On the other hand, insec-pests such as Coffee berry borer, *Hypothenemus hampei*, Coffee thrips, *Diarthrothrips coffeae*, green scale, *Coccus alpinus* and Coffee cushion scale, *Stictococcus formicarius*, are potentially important pests. However, the result of the study indicated that the major insect-pest affecting coffee production in the study area were termite and stem borer while the least was Green scale (Table 15). Termite pose serious problems on coffee production by feeding on the bark or skin of the tree and also by making tunnel or passageway of another fungal and bacterial diseases and causes considerable

yield loss.

Table 15. Major coffee insect pest ranked by the respondents.

No.	pest	Index score	Rank
1	Termites	0.4500	1
2	Stem borer	0.3868	2
3	Berry borer	0.0871	3
4	Green scale	0.0760	4

Source: Own survey result, 2015.

Index score for a particular coffee insect pest = [4 for $Rank_1$ + 3 for $Rank_2$ + 2 for $Rank_3$ + 1 for $Rank_4$] divided by sum of [4 for $Rank_1$ + 3 for $Rank_2$ + 2 for $Rank_3$ + 1 for $Rank_4$] for all coffee insect pest.

3.4. Opportunities of Coffee production

Coffee is the major income generating cash crop for the study area. Farmers have got much experience on coffee production which developed from long year coffee production and this will enable them to enhance production and productivity of coffee. Construction of rural road, availability of coffee plantation enterprise in the area and proximate to Mechara Agricultural Research Center were among major opportunities for coffee production in the study area.

4. Conclusion

The study indicated that coffee is the major income generating cash crops for the study area. But, because of drought, diseases, pest and low price of coffee, it was being substituted by *Khat edulis* in some place where *Khat edulis* can be grown. The study also revealed that majority of the respondent transplanted coffee seedling which dropped from mother tree and, grown under its beneath to seed bed and coffee field. *Erthrina abyssinica* is desirable permanent coffee shade while *Cordia africana* is not desirable coffee shade.

Lack of improved coffee varieties recommended for the study area, diseases, pest, drought and low price were among major constraints of coffee production in the study area. However, being major income generating cash crops of coffee for the study area, construction of rural road, proximate of the area to Mechara Agricultural Research Center and availability of coffee plantation enterprise in the area were major opportunities for coffee production in the study area.

5. Recommendations

Depending on the results of the finding, the following recommendation has been given to improve coffee production and productivity and thereby livelihoods of coffee producers in the study area.

- ✓ Coffee landraces grown by coffee producers in the study area were susceptible to diseases, insect pest and drought. Therefore, the responsible body should give special emphasis to develop and promote improved coffee varieties for the study area.
- ✓ Coffee farm management system and agronomic practices of farmers of the study area were traditional. Therefore, emphasis should be given in enhancing extension services to improve their skill and knowledge on coffee production system.
- ✓ Improving coffee marketing condition was also another important issue since farmers of the study area reported that low price of coffee was another constraint of coffee production.
- ✓ Enhancing infrastructural and institutional facilities such as market information, road and transportation were also found to be vital to motivate coffee producers and increase coffee production and productivity in the study area.

6. References

Addis, T., Endale, T. and Teshome, M. 2015. Effect of temporary shade tree species on growth performance of newly transplanted Arabica coffee seedlings at Jimma.

Berhanu Tsegaye. 2017. Ethiopian coffee sector strategy and future prospects, Addis Ababa, Ethiopia.

CDOoANRM (Chole District Office of Agricultural and Natural Resource Management), 2015. Agricultural Office Annual Report, 2015. Chole, Arsi Zone, Oromia region, Ethiopia.

Crowe, T.J. and Tadesse, G. 1984. Coffee pests in Ethiopia, their Biology and *control*, IAR. Addis Ababa, Ethiopia.

CSA (Central Statistical Agency), 2016. Agricultural sample survey: Report on area and production of major crops of Private Peasant Holdings for meher season of 2016. Addis Ababa, Ethiopia.

Eshetu Derso .1997. Coffee diseases and their significance in Ethiopia. *ASIC* **17**(I):
723-726.

Eshetu Derso .2000. Pre selection method for coffee berry disease (CBD) resistance in Ethiopia. In: *proceedings*

of the workshop on control of coffee berry Disease (CBD) in Ethiopia, pp. 47-57. 13-15 August 1999, Addis Ababa, Ethiopia

GAIN (Global Agricultural Information Network). 2014. Coffee annual report, ET 1402

Getachew, D. 2011. Coffee market performance analysis. A case of eastern Ethiopia.

GDOoANRM (Gololcha District Office of Agricultural and Natural Resource Management), 2015. Agricultural Office Annual Report, 2015. Gololcha, Arsi zone, Oromia region, Ethiopia.

James, W. Tim, S. and Leulsegged, K. 2015. Woreda level crop production ranking in Ethiopia. International Food Policy Research Institute (IFPRI) Addis Ababa, Ethiopia.

Jose, D. 2012. Ethiopian coffee: Challenges and opportunities. Ethiopian coffee export conference, Addis Ababa, Ethiopia.

Million Abebe. 1987. Insect pests of coffee with special emphasis on Antestia bug, *Antestiopsis intricate*. In: *Ethiopia Insect scenes and Applocatopm*, 8:977-980.

Tadesse ,W. 2015. Coffee production systems in Ethiopia: environment and coffee forest forum, Addis Ababa, Ethiopia.

Tolera FG, Gebermedin GA (2015). Opportunities and constraints of coffee production in West Hararghe Zone, Ethiopia. Journal of Agricultural Economics and Rural Development, 2(4): 054 - 059.

Trading economics, 2016. Ethiopian exports 2006-2016 data.

World Bank, 2015. Risk and finance in the coffee sector. A compendium of case studies related to improving risk management and access to finance in the coffee sector.

Wosene Gebreselassie, Ali Mohammed and Anteneh Netsere. 2010. Pre-sowing treatment of coffee (Coffee arabica L.) seeds to enhance emergence and subsequent growth of seedlings. *Research Journal of Seed Science*, 3:218-226.

Zelalem, G. 2015. Improving seed quality for greater yield, food security in Ethiopia.

Zelalem Girma. 2016. Ethiopia re-established Coffee and Tea Authority to commence operation.