

Review on Coffee Production Constraints and Opportunities in Ethiopia

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ABSTRACT

Coffee is the fore most important food commodity world- wide including Ethiopia and ranks second, after crude oil among all commodities. It is additionally one of the most profoundly important cash crops in Ethiopia. However, Ethiopia till today has not yet fully exploited the potential of this crop as the producer and birth place of coffee. This is mainly due to different factors. Hence, important data has been gathered on different aspects of the coffee with the objectives of reviewing coffee production constraint's and opportunities in Ethiopia. Diverse information from GAIN, FAOSTAT, CSA and distributed materials on coffee were utilized. According to the review, lack of competitiveness, lack of infrastructure, little market promotion and incentive mechanism, in adequate access to services, low value addition, in adequate technology transfer and research, ineffective and wasteful approach systems, expansion of khat farming, precipitation variability, price fluctuation, little market promotion and incentive mechanism are among major constraints of coffee production in Ethiopia. Immense opportunities for the production of coffee were identified such as, the presence of all-weather road, convenient topography, fertile land, good climatic conditions, good government policy, support from agricultural office, irrigation access, presence of market access, presence of NGOs for support, sufficient labor and year round rainfall were mentioned as some of opportunities that can be used for further improvement of production and productivity of coffee Ethiopia. Therefore, enhancing infrastructural and institutional facilities enhance extension service, improving coffee production technologies through development, licensing of more traders and inspecting their activities, providing improved coffee varieties and other related agronomic practices were among the major recommendations forwarded from the review. Consequently, it is better to improve coffee production and productivity trends by solving the constraints and using possible opportunities as a country in order to bring important changes in this sub sector.

Keywords: Production system; Coffee berry disease; Export crop; Small holder farmers; Productivity

INTRODUCTION

Background of the Review

Ethiopia is the homeland and the birth place for (*Coffea arabica* L), and the world's fifth-largest exporter [1]. The primary Arabica coffee vegetation have been cultivated here and farmers maintain to harvest the majority of the crop from wild coffee plants as they harvest for centuries. Coffee is the most important foreign currency earner which provides important income for country. It represents 34% of the nation's total export earnings [2]. The coffee sub sector shares about 4-5% to the country's

Gross Domestic Product (GDP) and creates local job opportunities [3].

In Ethiopia, 856,591.99 ha of land had been allotted for coffee production and 5,847,895.69 tones were received with average productivity of 0. 683tones ha⁻¹ in 2020/21 Meher Season which is far below the world average productivity. This might be attributed to different physical, biological and manmade factors; one of which is the lack of high yielding varieties at the farmers' hand. Biological and institutional factors also play greater role in coffee production. Diseases, insect pest, poor access to market information, lack of physical infrastructure, lack of improved

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coffee variety and poor extensions services were the major constraints of coffee production [4]. In Ethiopia, coffee is mainly produced in the southwest (former Kaffa, Illubabor and Wollega), southeast (Bale and Harerge), south (former Sidamo) parts of the country. These areas are found to be the well-known coffee sorts regarded internationally by the names together with Yirgacheffe, Sidama, Harar, Limmu, Gimbi, etc. brand coffee types which fetch a premium price and playing a remarkable role in world market. Of which Yirgachaffee is internationally Known and recognized and has intense flavor known as flora. Has fine acidity and rich body. Many rosters are attracted to its fine and flavor and are willing to pay a premium price for it. While Gojam, Wollo, Arsi and Tigrai areas are categorized minor producers. From top 25 coffee producing areas in Ethiopia, Oromia dominates with 18 coffee producing districts and the remaining top coffee producing districts are located in South Nations, Nationalities and Peoples Regional State.

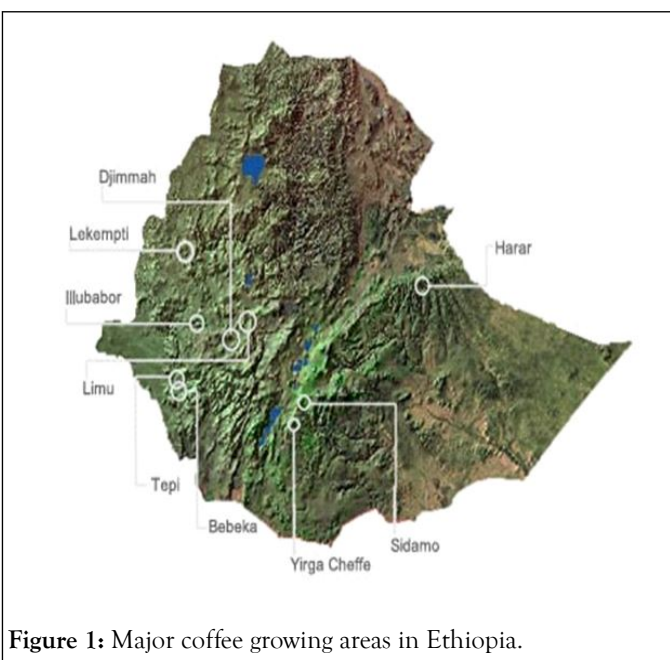


Figure 1: Major coffee growing areas in Ethiopia.

Ethiopian coffee sector has bright potentialities. The country has suitable altitude, optimum temperature, sufficient labor 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. Other 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. Coffee, the backbone of Ethiopia's economy, is the most important export commodity. During 2017/18 marketing year alone Ethiopia registered a record almost 917 million US dollars from coffee exports [2].

In Ethiopia, coffee grows at diverse altitudes, ranging from 550 to 2,750 m above sea level. Where other climatic factors, particularly, temperature is suitable. However, Arabica coffee nice flourishes and produced among altitudes of 1,500 and 1,800 masl, annual rainfall quantity ranging from 1,500 to two,500 mm with best minimal and most air temperature of 15 and 30°C, respectively. Extreme and big

fluctuations for the duration of the day and between the day and the night time have damaging effect on production.

Despite the presence of high variability and large number of varieties released in the country most of the farmers still using their land races. Moreover, officially released varieties are also location specific. The average green coffee bean yield per hectare per year is 0.683 t ha⁻¹ which is by far lower than the world average and the average of Brazil 0.8 and 1.3 t ha⁻¹, respectively. This might be attributed to different physical, biological and manmade factors; one of which is the lack of high yielding varieties at the farmers' hand. Diseases, insect pest, poor access to market information, lack of physical infrastructure, lack of improved coffee variety and poor extensions services were the major constraints of coffee production [4]. In addition, poor management practices, low soil fertility and poor pricing are considered as major constraints of coffee production. The changes in climatic conditions are also predicted to profoundly influence the population dynamics and the status of agricultural insect pests and diseases development.

The increase in temperature has a strong and direct influence on insect development, reproduction and survival [5]. Coffee diseases cause considerable losses when not treated. According to Cerda, 57% yield loss was observed by the infection of disease causing organisms on coffee crop. According to Jima also report the most economically important pathogenic coffee diseases are Coffee Berry Disease (CBD), Coffee Wilt Disease (CWD) and Coffee Leaf Rust (CLR), and physiological disorder like coffee branch die back is caused by *Pseudomonas syringae* and non-pathogenic agents. Similarly, major insect pest that affects coffee production in Eastern Ethiopia were coffee stem borer and coffee berry borer. On the other hand, insect pests such as coffee trips, green scale and coffee cushion scale were reported as important coffee production constraints in the country. A lot of coffee production constraints were made in Ethiopia. But they are not able to cover all coffee producing areas in the country. Thus this activity was carried out to cover untouched coffee producing areas of the southern Ethiopia and came up with possible solutions for the problems and recommendations for the opportunities. Hence agronomic, socio economical and environmental challenges and opportunity, gap identified, documented for further utilization and recommendation of appropriate solutions. Thus this paper was aimed to review coffee production constraints and opportunities coffee production Ethiopia.

Objectives of the review

To review coffee production constraints and opportunities in Ethiopia

Significance of the review

Coffee, the backbone of Ethiopia's financial system, is the most essential export crop these days named as a green gold, contributing to the livelihoods of more than 7 million smallholder farmers. This sector is an important sector in Ethiopia. Hence, this review provides information regarding on coffee production constraints and opportunities in Ethiopia. The information is expected to have valuable input that helps to

understand to overall production constraints, and production potentials of coffee in the country. The data generated on this assessment can help a number of company's such as: national and worldwide studies establishments, development businesses, buyers, producers, policy makers, extension carrier vendors, authorities and non-governmental companies

Coffee production and production systems in Ethiopia

Ethiopia is the leading C. Arabica producer in Africa and the fifth largest coffee producer, in the world accounting for 4 % of production. Coffee grows almost all parts of the country where other climatic factors, particularly, temperature is suitable. More than 7 million small holder farmers engaged in this sector (CSA,

2020). It employs 15 million people, or roughly 15 percent of the country's population at different points along the value chain. Nearly 95 percent is cultivated on small plots, generally less than half a hectare. The production of coffee has increased from 2012/13 to 2016/17 and then declined. The yield increment 2012/13 to 2016/17 may be due to favorable weather conditions, low disease and pest pressure, enough rainfall in coffee growing areas of the regions and better extension services in some coffee growing areas. However, the total area of land allocated for the production of coffee has been increased by 15% from 2013/14 to 2020/21 over the past nine years at different rates. Here below Table (1) also indicated that there was a fluctuation in yield of coffee over the last nine years in the country.

Table 1: Estimated Area Pre and Post-harvest yield of coffee over nine years CSA data in Ethiopia.

Year	Area (Ha)	Production / Quintal	Area (Ha)	Production / Quintal	Average Yield/ Ha
2013/14	5,38,466.80	45,46,785.00	5,38,466.80	39,20,062.22	7.28
2014/15	5,61,761.82	47,23,483.00	5,61,761.82	4,201,978.41	7.48
2015/16	6,53,909.76	52,70,777.00	6,53,909.76	4,145,787.87	6.34
2016/17	7,00,474.69	46,90,911.24	7,00,474.69	46,90,911.24	6.7
2017/18	7,25,961.24	50,19,513.00	7,25,961.24	44,92,298.08	6.19
2018/19	7,64,863.16	49,45,743.63	7,64,863.16	49,45,743.63	6.46
2019/20	7,56,852.50	48,25,605.71	7,58,523.29	48,25,605.71	6.36
2020/21	8,56,591.99	58,47,895.69	8,56,591.99	58,47,895.69	6.83

Source: Own computation from CSA data from CSA 2013/14;2014/15; 2015/16; 2016/17; 2017/18; 2018/19; 2019/20; 2020/21 for the last nine years

In Ethiopia coffee Production systems are dominated by smallholder farming under rain fed conditions with little mechanization. Subsistence mixed farming with crop cultivation and livestock husbandry is practiced on most farms. The majority of coffee production (95%) comes from the smallholder farmers while the rest is produced by large-scale producers (state farms and investors) and 95% of which the coffee production from these systems can be considered as organic, although not yet officially certified. The main coffee producing areas in Ethiopia are west and south west, southern, eastern, and central regions [6]. On the basis of management level, vegetation, structural complexity, and agronomic practices, coffee production systems in Ethiopia can be categorized into four; namely: Forest Coffee (FC), Semi-managed Forest Coffee (SFC), Garden Coffee (GC) and plantation [7].

Forest Coffee: It is self-sown and grown under the full coverage of shade of natural forest trees. Forest coffee system uses wild stands of coffee, which exists naturally within the forest and the farmer undertakes minimal management and intervention. It is found in South and South-Western Ethiopia (Bale, West Wolega, Bench-Maji, Kaffa, Sheka, Metu and Jimma). The local

communities living in and around the forest simply pick the wild coffee berries from naturally growing coffee plants and there is no management to improve coffee productivity. The floristic composition, diversity and structure are close to the natural situation, with little human intervention. The only management practice in the forest system is access clearing to allow movement in the forest during harvesting time [8]. This system is found in southeastern and southwestern parts of the country (mainly in areas like Bale, Bench-Maji, Illubabor, Kafa, Jimma, Shaka, and West Wollega) [9]. These areas are the centers of origin of Coffea Arabica. This system accounts for about 10% of the total coffee production of the country [10].

Semi-Forest Coffee: It accounts for about 35 % of Ethiopia's total coffee production. Semi-forest coffee is more intensive, with increased farming interventions e.g. thinning of trees, understory clearance and weed cutting, and planting of coffee seedlings [11]. Farmers acquires forest land for coffee farms, and then thin and select the forest trees to ensure both adequate sunlight and proper shade for the coffee trees [12]. It is a type of coffee production system where instantly the forest coffee system is converted to semi-managed forest coffee system through

reduction of plant composition, diversity and density. This is the dominant production system in southwester Ethiopia (mainly Bench-Maji, Illubabor, Jimma, Kafa, Shaka, and Wollega) and in the Bale Mountains of southeastern Ethiopia. This system accounts for about 35% of the total coffee production of the country [13].

Garden Coffee: is a further step in the cultivation process. Seedlings are taken from forest coffee plantations and transplanted closer to farmers' dwellings. In this system, coffee is grown in well managed smallholdings under a few shade trees usually combined with other crops and fruit trees [14]. It accounts for approximately 50% of national production and is located near residences of growers. It is planted at low densities and is mostly fertilized with organic materials [15]. In this system, recommended agronomic practices like improved seedlings, spacing, proper mulching, maturing, weeding, shade regulation and pruning are practiced. Geographically, this coffee production system is mainly found in the southern and eastern and some in southwestern parts of the country; and specifically in Gedeo, Guji, Hararghe, Jimma, Sidama, Wollega and some other places [16].

Plantation Coffee: Plantation coffee is grown on plantations owned by the state and on some well managed smallholder's coffee farms. In this system, recommended agronomic practices like improved seedlings, spacing, proper mulching, manuring, weeding, shade regulation and pruning are practiced [17]. This sector includes a few large private and state farms mainly located in the south-west, as well as many smallholder plantations spread all over the coffee growing areas. Coffee production in Ethiopia Coffee is grown by over 7 million small holder farmers. Farmers engaged in growing and producing stimulant crops such as coffee are greater in number than those growing fruits. It employs 15 million people, or roughly 15 percent of the country's population at different points along the value chain. About 95% percent is produced by small scale farmers the rest 5% from state farms. Ethiopia is the world's fifth largest coffee producer, accounting for 4 percent of production. It is also the largest producer in Africa, accounting for about 40 percent of continental production [18].

Opportunities of coffee production in Ethiopia

Coffee production is the major income generating way to feed households in Ethiopia. Genetic diversity and favorable Environments, Agro-forestry based production system, already known brands in the world market, trademarked and licensed benefit to all, Modern Marketing System, Encouraging policy and coffee price are among major opportunities of coffee production in Ethiopia [19].

The country has suitable altitude, optimum temperature, low labor costs and fertile soil. It can sustainably produce and supply fine specialty coffee of superior quality with potential of producing all coffee types of the various world coffee growing origins. The Ethiopian coffee sector has bright prospects. Investigation carried out in Ethiopia shows that based on the land suitability classification, a total land area of 12.53 million ha, was identified to be highly suitable land, 5.46 Million ha moderately suitable 5.11 million ha marginally suitable land for coffee production of which currently only 856,591.99 ha of land under production 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 [20]. The Ethiopian Coffee and Tea Development and Marketing Authority have 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. 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 [21].

Ethiopian coffee is top in both color and taste. To maintain these qualities, there is a well-established and linked structure that connects coffee farmers, processing-plant owners, governmental organization and coffee processing. In Ethiopia despite the constraints immense opportunities were observed. The existence of all-weather roads, convenient topography, land, relatively favorable weather, water irrigation and convenient government policy, and support from agricultural offices were some of the opportunities that can be used as an advantage for the improvement of coffee production. Thus it is possible to improve coffee production and productivity by solving the constraints and using possible opportunities in the country level [22].

Production constraints of coffee in Ethiopia

Coffee is a gift from Ethiopia to the rest of the World. However, the current average productivity is too low 6.83 Q/ha though, the productivity varies from farmer to farmer on the basis of their crop management they applied (CSA, 2020). Similarly, Production also varies significantly from one year to another, due to different factors. In Ethiopia a lot of coffee productions, processing and marketing problems assessments were made. According report the key registered production constraints were lack of competitiveness, lack of incentives, lack of infrastructure,

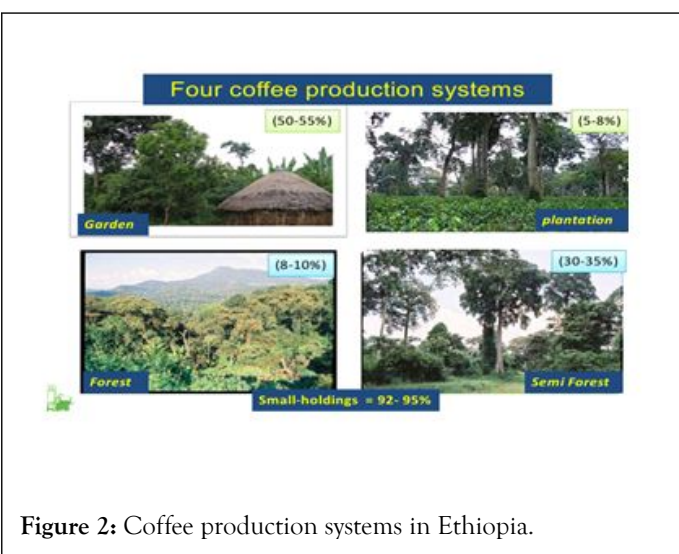


Figure 2: Coffee production systems in Ethiopia.

in adequate access to services, low value addition, and in adequate technology transfer and research. In recent days, Expansion of Khat farming is competing for farm land with coffee. Many small holder coffee farmers replace khat instead of coffee as they are attracted by the high prices and greater yield they get from cultivation of khat. In Ethiopia now days a significant number of farmers diverted from coffee production to khat production. According to Gebermedin report 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. Similarly, Davis also reported that the other challenge of coffee production in Ethiopia is the variability of weather pattern such as rainfall variability on the onset of the wet season, extension of dry season and more extreme (drier and hotter). According to Ango report deforestation and change in land use are threatening coffee forest gene pools in Ethiopia. This has been aggravated with the recent coffee price crisis on the world market as a result of market liberalization. Farmers are shifting their coffee farm or forest to other monoculture crop production. Kebede, also added deforestation and land degradation, diseases, predominant traditional production, failure of using appropriate coffee technologies, inadequate services (credit, inputs, equipment's), and lack of sustainability and competitiveness in the coffee sector.

According to the findings of Tadesse [23] coffee diseases cause considerable losses when not treated. Similarly, Cerda, added that 57% yield loss was observed by the infection of disease causing organisms on coffee crop. Also reported that the most economically important pathogenic coffee diseases are Coffee Berry Disease (CBD), Coffee Wilt Disease (CWD) and Coffee Leaf Rust (CLR), and physiological disorder like coffee branch die back is caused by *Pseudomonas syringae* and non-pathogenic agents. Similarly, CBD and branch dieback were causing high yield loss of coffee production. As cited about 30% of national average crop losses to total harvestable coffee yield recorded due to CBD. The production and productivity of farmers' variety and cultivars can be improved by using improved agronomic and best management practices [24]. Similarly, lack of improved seed varieties is one of the most important problems in coffee production. Unlike other crops, there is no any public and/or private sectors responsible to produce and market coffee seeds. In addition to this, there is no national coffee seed standard and certification scheme. The production and productivity of farmer's variety and cultivars can be improved by using improved agronomic and best management practices. In addition to this sub-sector is also constrained by the prevailing ineffective and inefficient policy frameworks that strongly affect the benefits obtained thereof (ICO, 2009)

Table 2: The World's Top 10 Coffee-Producing Countries in 2013 crop year (Volume in 000 bags).

Rank	Countries	Thousands of bags
1	Brazil	49,152
2	Vietnam	27, 500
3	Indonesia	11, 667
4	Colombia	10, 900
5	Ethiopia	6, 600
6	India	5, 192
7	Honduras	4, 200
8	Peru	4, 200
9	Mexico	3, 900
10	Guatemala	3, 130

Source: ICO, 2014; measured in thousands of bags, One bag weighs 60 kilograms.

Intervention areas for further improvement of coffee production

Supply of improved, early maturing and disease resistant varieties were considered the critical point of intervention in which the famers believe to improve coffee production and productivity followed by provision of technical trainings. Despite

the presence of different problems in the course of the production of coffee. Even if different integrated method could be used to control the disease, coffee production system in Ethiopia would not allow the use of chemical. So that farmers were using cultural methods to manage it and other diseases. Among which application of ash, mulching, cutting infested tree and burning (CUBU), uprooting the infested tree and burning

(UPBU), farm tools disinfection by fire, planting resistant varieties were frequently used methods. However, most of the farmers (24.1%) stated that they had no idea on managing CBD in their coffee field [25].

In other hand, tremendous opportunities for the production, marketing of coffee there exist. The presence of all-weather road, convenient topography, fertile land, good climatic conditions, good government policy, support from agricultural office, irrigation cannel, presence of market access, presence of NGOs for support, safe market, sufficient labor, sufficient land, sufficient rainfall, sufficient water for irrigation and village crossing rivers were mentioned as some of opportunities that can be used for further improvement of production and productivity of coffee in the studied areas. Findings the most important opportunities that can be utilize in the future so as to boost coffee productivity. They mentioned are accessibility of rural road, proximate to Agricultural Research Center and availability of coffee plantation enterprise in the area were among major opportunities for coffee production. They also 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 as country level.

CONCLUSION AND RECOMMENDATIONS

Coffee is Ethiopia's important export crop, contributing to the livelihoods of more than 7 million smallholder farmers, and counts for a large share of income for a number of Ethiopian smallholders. Today, Ethiopia Africa's largest producer and major exporter of Arabica beans, the quality coffee to the world. But, in spite of its significance, little or no efforts were made in the United States to solve the constraints and recognize possibilities at the producer degree. This review provides an overview on coffee production, opportunities and constraints in Ethiopia. Depending on the results of the review, Lack of improved, early maturing and disease resistant varieties, lack of competitiveness, lack of infrastructure, in adequate access to services, low value addition, in adequate technology transfer and research, competition of khat and rainfall variability are among major constraints of coffee production in Ethiopia. Price volatility, Poor accesses to market, little market promotion and incentive mechanism, and low price were reported to be the major problem of coffee marketing in Ethiopia. The review revealed that larger average net profit was obtained by the intermediaries than the producers and producers were less beneficiaries in the coffee market chain than the other actors. Depending on the review made, the following recommendation has been given. Lack of improved cultivars, unavailability of improved production technologies, physiological problems like die back and minimum or no use of agricultural inputs by small holder is also important factors for low coffee yield. Moreover, Ethiopian coffee is inferior in yield and superior in quality to other producers, which is mainly because of backward

cultivation and harvesting system. Effective supply of agricultural inputs, such as planting improved varieties, fertilizers, insecticides, at affordable prices, should be encouraged. However, the use of both organic and mineral fertilizers is either nil or very limited to some production systems (e.g., large commercial plantations).

Evidence from long time studies in the country indicates that nutrient inputs (from both organic and inorganic sources) can boost productivity and quality of coffee if used in appropriate balance and rates. CBD still cause significant crop losses on susceptible landraces although the magnitudes vary from place to place and from time to time. Thus phytosanitary measures such as regular field monitoring, uprooting and burning and/or burring infected plant should be taken seriously in to account as there was no any scientifically approved measures so as to manage most of coffee diseases. Strong efforts should continue to aware and sensitize and intensively train coffee farmers and extension workers about the diseases and their management through practical training. It can be recommended that testing the adaptability of improved coffee varieties that tolerate major disease and drought, generation of new varieties for the areas, enhancing extension services to improve farmers' skill and knowledge on coffee production system and risk alleviating mechanisms, testing soil fertility and developing soil fertility mechanisms, establishment of market places in the vicinities of producers, strengthening and/or establishment seed producing institutions found to be vital to motivate coffee producers and increase coffee production and productivity.

In general, according to the review there has been a downward fashion in coffee production as a result of these challenges over the years. Thus, solving biotic (disease, insect pest, weed and vertebrate animals), abiotic (drought. soil fertility reduction, frost, heavy rain, etc.) problems and by exploiting production, infrastructural and technical opportunities, is very crucial in order to improve the production and productivity of coffee.

Depending on the review made, the following recommendation has been given to improve coffee production and productivity and thereby to improve livelihoods of coffee producers as country.

Government, research institutions and non-governmental company must have integrated to present unique emphasis to assist farmer to hold coffee production sustainability.

Government should give also special focus providing extension services for growers on appropriate technologies practices and other related agronomic practices.

The government should also create an efficient, transparent and orderly marketing system serving the needs of all market players and promoting increased market participation of Ethiopian small-scale producer's and better international promotion of Ethiopian coffee.

REFERENCES

1. Tefera A, Tefera T. Coffee Annual Report Approved', Global Agricultural Information Network. 2014;1-9.

2. USDA. Ethiopia: Coffee Annual Report', Usda Fas, (ET-1302). 2019.1-9.
3. EBI. Government of the Federal Democratic Republic of Ethiopia: Ethiopia's Fifth National Report to the Convention on Biological Diversity Ethiopian Biodiversity. 2014;72.
4. Gebermedin F, Tolera G. 'Opportunities and constraints of coffee production in West Hararghe, Ethiopia. J Agri Econom Rural Dev. 2015;2(4):54-55
5. Ward NL, Masters GJ. Linking climate change and species invasion: An illustration using insect herbivores', Global Change Biology. 2007;13(8):1605-1615.
6. Alemayehu D, Merga W. 'Current Status of Arabica Coffee (Coffea Arabica .L Genetic Resource: Conservations, Constraints and Mitigation Strategies in Ethiopia', International J Resarch Stud Sci, Engin Technol. 2017;4(10):1-11.
7. Ango TG, Hylander K, Börjesson L. Processes of forest cover change since 1958 in the coffee-producing areas of Southwest Ethiopia, Land. 2020;9(8):9-11.
8. Cerda R. Primary and secondary yield losses caused by pests and diseases: Assessment and modeling in coffee, PLoS ONE. 2017;12(1): 17.
9. CSA (Central Statistical Agency). Reports on area and production of crops (Private Peasant Holdings, Meher Season). Addis Ababa, Ethiopia. 2013.
10. CSA (Central Statistical Agency). Reports on area and production of crops (Private Peasant Holdings, Meher Season). Addis Ababa, Ethiopia. 2014.
11. CSA. 'Woreda -Level Crop Production Rankings in Ethiopia: A Pooled Data Approach James Warner Tim Stehulak Leulseged Kasa International Food Policy Research Institute (IFPRI) Addis Ababa, Ethiopia', (January). 2015;118.
12. CSA (Central Statistical Agency). Reports on area and production of crops (Private Peasant Holdings, Meher Season). Addis Ababa, Ethiopia. 2016.
13. CSA (Central Statistical Agency). Reports on area and production of crops (Private Peasant Holdings, Meher Season). Addis Ababa, Ethiopia. 2017.
14. CSA (Central Statistical Agency). Report on area and production of crops (private peasant holdings, meher season). Addis Ababa, Ethiopia. 2018.
15. CSA (Central Statistical Agency). Reports on area and production of crops (Private Peasant Holdings, Meher Season). Addis Ababa, Ethiopia. 2019.
16. Davis A, Moat J. Coffee Farming and Climate Change in Ethiopia: Impacts, Forecasts, Resilience and Opportunities. 2017;37.
17. Food W. STATISTICS STATISTICAL YEARBOOK. 2020.
18. Degaga J, Melka T, Angasu B, Alemu G, Zewdu A. Constraints and Opportunities of Coffee Production in Arsi Zone: The Case of Chole and Gololcha Districts. Eur J Bus Manag. 2017;9(10): 8-17.
19. Kebede T. Coffee quality and productivity as basic factors for sustainability in Ethiopia Presentation content', 2st African Coffee Sustainability Forum. 2012;1-8.
20. Kufa T. Sustainability of Coffee Environments & Genetic Resources in Ethiopia. Edited by: Abenet Girma (MSc) Reviewed by: Tesfave Alemu (PhD). 2020.
21. Sette JD. Ethiopian Coffee: Challenges and Opportunities', Ethiopian Coffee exporters conference. 2012;1-11.
22. Tadesse T, Tesfaye B, Abera G. Coffee production constraints and opportunities at major growing districts of southern Ethiopia', Cogent Food and Agriculture. 2020;6(1).
23. THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA CENTRAL STATISTICAL AGENCY (2020) 'the Federal Democratic Republic of Ethiopia Central Statistical Agency Report on Area and Production of Crops', 2008(December 2007).128.
24. Tsegaye B. Ethiopian Coffee Sector Strategy and Future Prospects. 2017.
25. Workie M. Ethiopian Highlands: Home for Arabica Coffee (Coffea arabica L.)', TrooiLakes 2015: Tropical lakes in a changing environment: water, land, biology, climate and humans, (May). 2015;58-65.