

# Pulse Crops Production Opportunities, Challenges and Its Value Chain in Ethiopia: A Review Article

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## Abstract

Agriculture is the main back bone of Ethiopian economy; crop production takes the largest share. The major crops category grown in all parts of the country are cereals, pulses and oilseeds, which not only constituted major food crops but also served as a source of income at household level and a contributor for the country's foreign currency earnings, among others. The objective of this review is to organize and make analysis on pulse crops production opportunities, challenges and its value chain in Ethiopia. To meet the objective of the study larger number of literatures has been reviewed. In Ethiopia, pulse crops are the second most cultivated crop next to cereals both in terms of area cultivated and volume of production. The suitability of soil and climate conditions for pulse crops cultivation makes Ethiopia a huge supplier of dry pulse crops in the international markets. More than twelve pulse species are grown in the country. Faba bean, field pea, chickpea, lentils, grass peas, fenugreek (lupine), haricot beans, soya beans and mung beans are the most important. Oromia, Amhara, SNNPR and Tigray regions are the largest producers of pulse crops. There has been substantial growth in pulse subsector since 2007/2008 in terms of volume of production and productivity (yields) but yields are low compared to international standards and overall production is highly constrained by lack of proper agronomic practices, weather shocks, and shortage of improved seeds, fertilizers and chemicals to control pests and diseases. In Ethiopia, pulse's value chains are long with many middlemen and relatively high margins goes to intermediates. Actors in the pulse crops value chain are constrained by so many factors, such as lack of infrastructures and financial services, weak linkages between exporters and producers, lack of sustained and adequate market to the exporters and farmers.

**Keywords:** Ethiopia, Pulse crops, Nitrogen fixation, Value chain.

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## 1. INTRODUCTION

### 1.1. Background

Ethiopia has rich agro-biodiversity resulting from its geography, climatic differences, ethnic diversity and strong food culture. The great variation in altitude ranging from sea level up to 4500 meters above sea level provides a great variation in climate and soil types which makes the country is profitable in agriculture (Rashid *et al.*, 2010; Ruters *et al.*, 2015; Mulugeta *et al.*, 2015). Agriculture contributes about 35.8 percent to the national GDP and still about 70 percent of Ethiopian population is employed in the agriculture sector (World factbook, 2018).

After cereals pulse are important crops growing in all parts of the country.

In the main agricultural areas of Ethiopia there are two rainy seasons, the main rainy season (*Meher*) and the *Belg* season. The main rainy season (*Meher*) runs from mid-June, July, August to mid-September and is the main cropping season. Crops cultivated in *Meher* season would be harvested in between September and February. The second season is *Belg* season which covers the months February to May has short and moderate rainfall. The harvesting period for *Belg* season crops is in between March and August. The *Meher* season is the main production season that accounts for over 95% of the national annual crop production (Alemayehu *et al.*, 2011; Broek *et al.*, 2014).

Pulses contribute to smallholder income as a higher value crop than cereals, to diet as a cost effective source of protein that accounts for approximately 15 percent of protein intake, also it is important as a foreign exchange earner for the country as the third-largest export crop after coffee and sesame (Broek *et al.*, 2014; Boere *et al.*, 2015; GAIN, 2018). Pulses are the second most important ingredients used in Ethiopian cultural food component of daily dish (USAID, 2010; Tewodros, 2014; Shewaye *et al.*, 2016; Alemneh *et al.*, 2017).

The inherent capacity of pulse crops to fix atmospheric nitrogen and the ability to increase the soil fertility and decrease the use of expensive chemical nitrogenous fertilizers make cultivation of pulses a good fortune for farmers and the environment (Kissinger, 2016; Karanja, 2016; Snapp *et al.*, 2018). Enhanced pulses production can also create opportunities for local value added processing, stimulate domestic demand, and provide off farm employment and sources of income for rural poor especially women and youth (Anjana, 2016).

Pulses cultivated on the cooler highlands of Ethiopia includes faba bean, field pea, chickpea, lentil, grass pea, fenu greek and lupine. In the warmer and low lands, the major pulses grown are haricot bean, cowpea, pigeon pea and mung beans (Chilot *et al.*, 2010). Ethiopia is one of the world's biggest producers and exporters of pulses. It is the second largest producer of faba beans after China and the sixth largest producer of chickpeas

and is also among the top five exporters of faba beans and one of the top ten exporters of chickpeas, dry beans and peas (Rutgers *et al.*, 2015; GAIN, 2018).

Due to the fact that pulse has high nutritional value and reduction in rampant malnutrition around the globe and are nutritious seeds for sustainable future FAO and United Nations have declared the year 2016 as “International Year of Pulses” (Anjana, 2016; Sivasankar *et al.*, 2016). In Ethiopia, the current productivity of pulses is below the demonstrated potential. Improvements in planting techniques could double overall pulse production to future years in Ethiopia (USAID, 2010; Chilot *et al.*, 2010).

## 1.2. Defining Pulse Crops

WHO and FAO (2007) and FAO (2016) defined pulses crops as dry seeds of leguminous plants which are distinguished from leguminous oil seeds by their low fat content. Dried beans, lentils, chickpeas and peas are the most commonly known and consumed types of pulses. Pulses have many shapes and sizes and can be found in different climatic conditions across Sub-Saharan Africa. They are the edible seeds of plants of the legume family (grain legumes) and they have in common that they grow in pods and can be dried and stored for longer periods of time without refrigeration. Mostly soybean and groundnut are considered as grain legumes, but because they are primarily used for oil extraction, though soybean and groundnut are not considered as pulses they have the same advantages for human health and environmental sustainability as pulses (Koroma *et al.*, 2016).

## 2. PULSE CROPS PRODUCTION IN ETHIOPIA

The suitability of soil and climate conditions of the country for pulse crops cultivation makes Ethiopia is a huge supplier of dry pulse crops in the international arena (GAIN, 2018). Twelve pulse species are grown in the country. Faba bean (*Vicia faba* L.), field pea (*Pisum sativum* L.), chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris* Medik.), grass pea (*Lathyrus sativus* L.), fenu greek (*Trigonella foenum-graecum* L.) and lupine (*Lupinus albus* L.) are categorized as highland pulses and grown in the cooler highlands of Ethiopia. Whereas, haricot beans (*Phaseolus vulgaris* L.), soya beans (*Glycine max* L.), cowpea (*Vigna unguiculata* L.), pigeon peas (*Cajanus cajan* L.) and mung beans are predominantly grown in the warmer and low land parts of the country (Chilot *et al.*, 2010; Karanja, 2016; CSA, 2018).

Chickpeas, grass peas and lentils are primarily grown on dark soils on residual moisture, in west and north Shewa zones of Oromiya; north and south Gonder, south Wollo, north Shewa, east and west Gojam Zones of Amhara; Goro zones of SNNPR; and the east Tigray zone. Faba beans and field pea, on the other hand, are grown during the main season on both red and black soils primarily in Amhara, Tigray, Oromiya and SNNPR regional states. Haricot beans are concentrated in the relatively dry and warmer parts of the country mainly along the Rift Valley. Production of haricot beans is also expanding in SNNP region, Gambella and Benshangul-Gumuz regional states (Chilot *et al.*, 2010).

Ethiopia is one of the top ten producers of total pulses in the world, the second largest producer of faba beans after China, the fifth or sixth largest producer of chickpeas and is the second largest producer of pulses in the common market for eastern and southern African countries (COMESA region) following Sudan. Sudan and Ethiopia have 32% and 22% share of the total COMESA pulses production (USAID, 2010). In Ethiopia, pulses are the third largest export crop behind coffee and oil seed (Boere *et al.*, 2015). The pulse industry has developed significantly with little intervention, but there exists a great potential to increase the production and impact of pulses through proactive and targeted support. Ethiopia could expand its foreign market presence by at least doubling its current exports through increased production levels. Smallholder income could also be increased by at least 40-70 percent per hectare of pulses planted through greater pulse productivity (with better inputs and sound agronomic practices), in other words there is an opportunity to stabilize and increase supply by improving production up to the full potential which would meet domestic demands, helping to ensure food security (IFPRI, 2010).

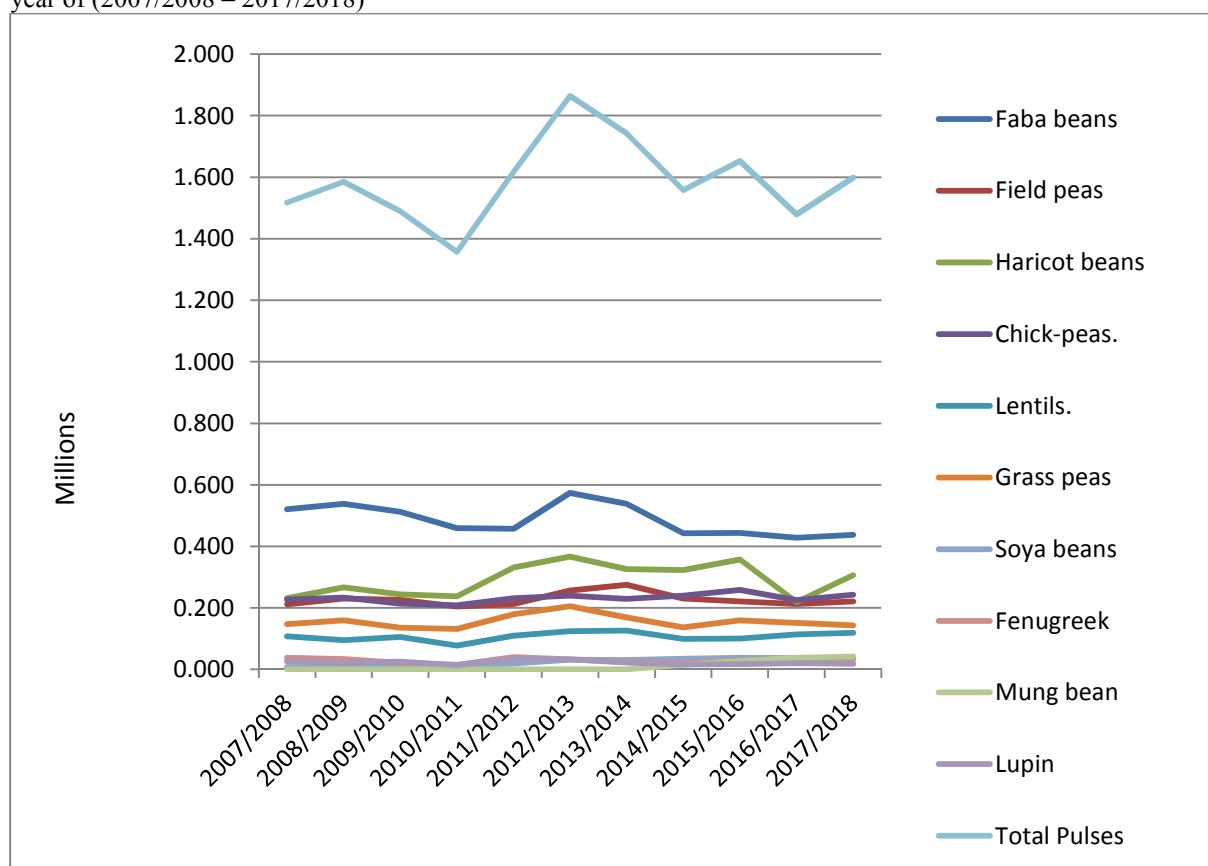
Productivity gap of pulse crops can be minimized through utilization of improved technology to enhance smallholder farmer’s income and their food security. The current productivity of pulse crops falls significantly below the demonstrated potential. For example, current average chickpea yields are 20.6 quintals per hectare (CAS, 2018) which is below the demonstrated potential (29 quintals per hectare) if accompanied by the appropriate inputs (Rashid *et al.*, 2010). According to Schneider and Anderson (2010) in Ethiopia with improved varieties it is possible to produce 14-50 quintals of lentils per hectare on research fields and 9–30 quintals per hectare on farmers’ fields and 40-60 quintals of peas per hectare on research fields. But as that of CSA (2018) agricultural sample survey report the national average productivity of lentils and field peas are 14.71 and 16.71 quintals per hectare on smallholder farmer’s fields, respectively.

However, Ethiopia is considered as the leading commercial producer and exporter of common bean (haricot beans) in Africa. Katungi *et al* (2011) explained most Ethiopian farmers had expanded their farm area under common bean but the use of fertilizer and improved varieties was still low. The same study revealed that average land allocated to common bean in a cropping season among the smaller farmers (landholding less than one

hectare) was 0.34 ha, which is about 33% of the total land under crops in season. On the other hand, larger farmers (with more than one hectare of landholding) allocated an average of 1.2 ha, about 36% of the crop area, to common bean.

According to CSA (2018) agricultural sample survey report in the main cropping season (Meher) of 2017/2018 about 8.32million smallholder farmers cultivated 1.60 million hectares of land (12.61% of the total cultivated land) with pulse crops, from which about 29.80 million quintals of pulses (9.73% of the total harvested grain crop) was harvested. The amount produced is second next to cereal crops. Faba beans, haricot beans, chickpea and field peas take the first four largest proportions, which is about 9.21, 5.20, 4.99 and 3.68 million quintals, respectively. Amhara, Oromia, SNNPR, and Tigray regions are the first four leading regions in producing pulses crops in the country. The total cultivated area under pulses in Amhara, Oromia, SNNPR, and Tigray regions is 0.68 (42.40%); 0.62(39.91%); 0.24(14.75%) and 0.037(2.33%) million hectares of land, respectively. Considering the volume of production these four regions, Oromia, Amhara, SNNPR and Tigray regions take the largest percentage proportions which are 43.7; 39.47; 13.31 and 1.19, respectively. Amhara and Oromia regions alone produce 83.17 percent of pulse crops. Fig1 summarizes the trend of land size cultivated with pulse crop for the last eleven years.

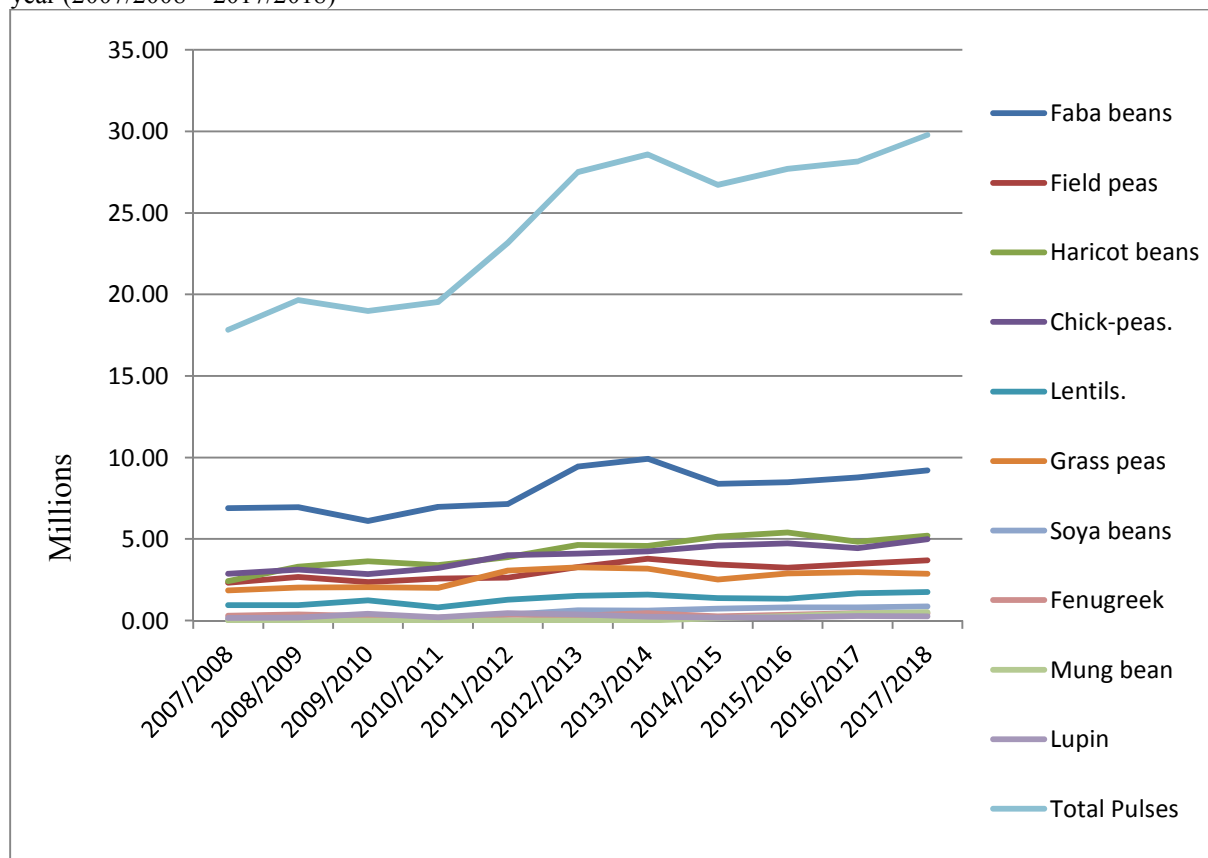
Figure1. Trends of land size cultivated with different pulse crops in Ethiopia (in million hectares) production year of (2007/2008 – 2017/2018)



Source: CSA (Central Statistical Authority of Ethiopia) agricultural sample survey reports (2008-2018).

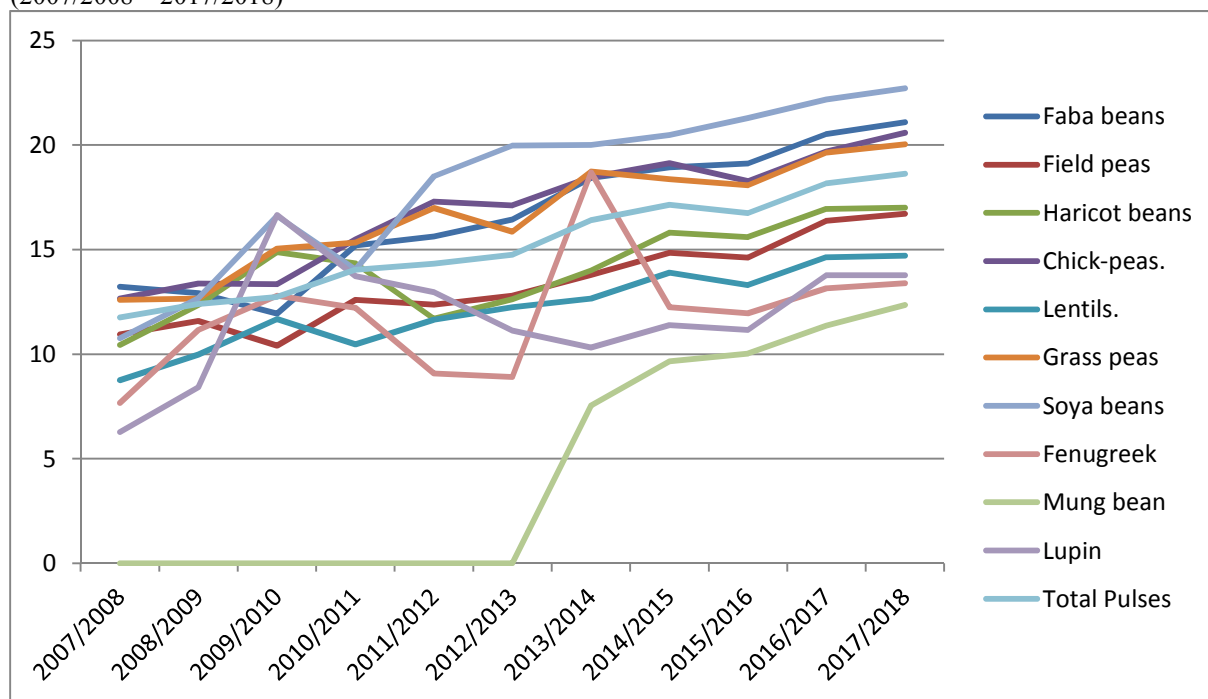
Area coverage has been increased by 5.34% between the cropping year 2007/2008 and 2017/2018 with annual growth rate of 0.95% (Fig.1). Pulses production by volume has been increased from 17.83 million quintals to 29.79 million quintals with annual increment of 6.86% for the same duration (Fig.2). Total pulses productivity, which is volume of production per unit area, has been increased from 11.75 quintals per hectare to 18.63 quintals per hectare that is 58.55% increment (Fig.3).

Figure2. Volume of production trend (in million quintals) of different pulses crops in Ethiopia, in the production year (2007/2008 – 2017/2018)



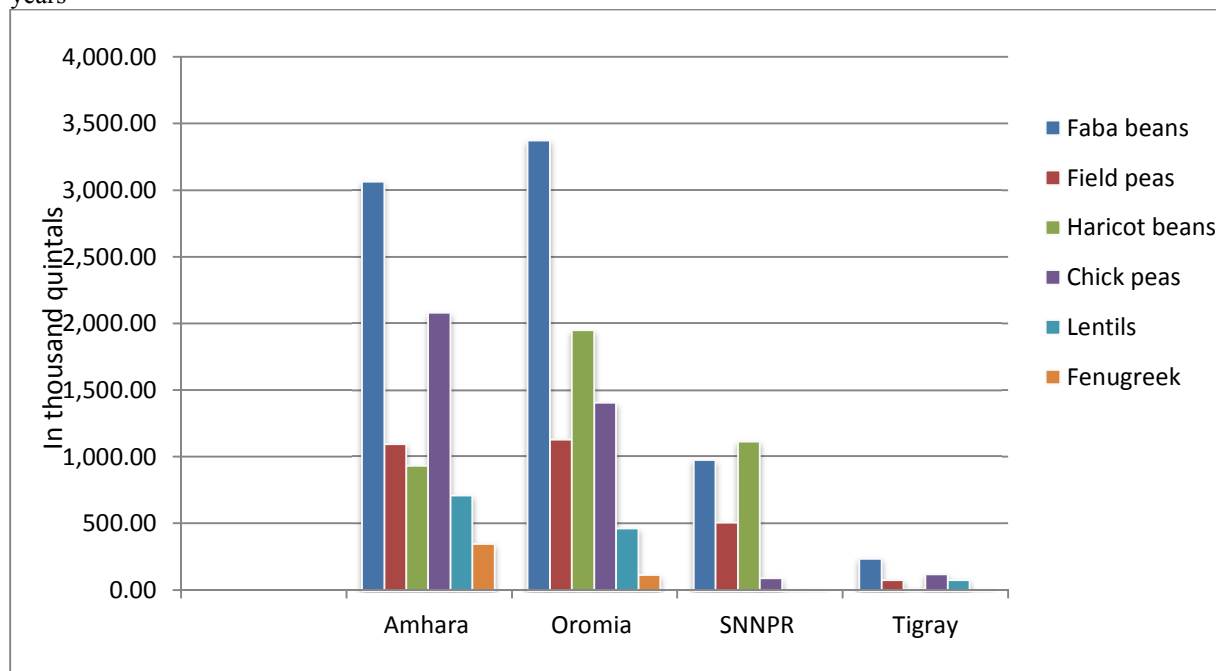
Source: CSA (Central Statistical Authority of Ethiopia) agricultural sample survey reports (2008-2018).

Figure3. Trends of productivity (quintals per hectare) of different pulses crops in Ethiopia, in cropping year (2007/2008 – 2017/2018)



Source: CSA (Central Statistical Authority of Ethiopia) agricultural sample survey reports (2008-2018).

Figure4: Top four pulse producing regions average volume of production (in 000 quintals) during the last eleven years



Source: CSA (Central Statistical Authority of Ethiopia) agricultural sample survey reports (2008-2018).

During the last eleven years Oromia region has been the largest producer of faba beans, field peas and haricot bean whereas Amhara region is the leading region to produce chickpeas, lentils and fenugreek. Next to Oromia region SNNPR is the largest producer of haricot beans.

## 2.1. Opportunities and Challenges to Produce Pulse Crops in Ethiopia

### Opportunities

The great variation in altitude ranging from sea level up to 4500 meters provides a great variation in climate as well, this makes Ethiopia is rich in biodiversity of plants and animals, temperatures range from a mean annual high of 30 degrees Celsius to a mean annual low of 10 degrees Celsius (Awetahegn, 2016). The variation in climatic condition and soil types makes Ethiopia is suitable for growing of a variety of crops including pulse food crops.

The demography and urbanization development of the country is attractive to agricultural investment, Ethiopia is the second most populated country in Africa (after Nigeria) and is projected to reach 130 million people in 2030 (Alemayhu and Yihunie, 2014). This huge consumer market is not only attracting international investors, it also offers huge potential for domestic and regional investment in cereal and pulse crop production. Pulses are central in many Ethiopian dishes, e.g. *shiro*, a popular pulse based sauce. Moreover, Ethiopians have a fasting period of over 200 days a year, and a range of pulses is consumed during this fasting period. Population growth, urbanization and income growth, in Ethiopia is expected to increase the demand for consumption of more processed pulse based foods (Koroma *et al.*, 2016; Alemneh *et al.*, 2017). More recently, in Ethiopia pulses became a substitute for meat due to exceptionally high prices of beef and mutton; households could have shifted to the consumption of pulses. Pulses are often consumed by the low-income groups because they cannot afford meat products (FAO, 2015). That is the abnormally high meat price increase makes growing of pulse crops become more attractive and profitable.

Pulse mature early than other crops, this may help farmers to resist water shortage. More over it helps to keep a household food secured till the other crops are harvested and the fund from sale of early harvested pulse crops used to buy labor to harvest other crops and to cover other immediate expenses, such as school fees. The other blessing property of these crops is their natural soil maintenance benefits through nitrogen-fixing, which improves yields of cereals through crop rotation, and can also result in savings for smallholder farmers from less fertilizer use (Rashid *et al.*, 2010; FAO, 2016). The soil maintenance property of these crops is very essential especially in the Ethiopian highlands, where the soil degradation and nutrient depletion is the main causes of low agricultural productivity and high food insecurity (Temesgen *et al.*, 2014; Adugnaw, 2014; Adugna *et al.*, 2015)

More recently, to develop the potential of the pulse sub sector the government of Ethiopia is taking various policy measures that used to increase the competitiveness of smallholder farmers. These policy initiatives paved the initial path for private sector participation in the pulse sector, which contributes to improvements in

production and exports. The initiatives seek to promote improved pulse production technologies with high yielding varieties, adoption of recommended fertilizer application rates and crop protection practices, and the promotion of pulse export trade and financing incentives to enhance the competitiveness of pulse exporters (Ruters *et al.*, 2015).

Agricultural Transformation Agency (ATA) has been established to address specific systemic bottlenecks by strengthening capacities and to introduce new technologies and approaches to accelerate production and commercialization of cereal and pulse crops through cluster approach, which involves 'using a market driven and geographically based approach to accelerate the transition of farmers from subsistence to commercial orientation. Through the cluster approach, a number of pulses and other grain legumes have been prioritized, in particular chickpeas, lentils, faba bean, soybeans, and haricot beans are the focus of attention (Koroma *et al.*, 2016). Ethiopia exports haricot beans, chickpeas, faba beans, lentils and field peas to many countries in Africa, the Middle East, Europe, Asia and America (Rashid *et al.*, 2010). Growth and transformation plan II (GTP II) of Ethiopia (implemented in 2014/15-2019/20) aimed at to increase average productivity of pulse crops from 17.2 quintals/hectare (GTP I) to 23 quintals/hectare by the end of 2019/20. Total production of pulse crops is projected to increase from 26.4 million quintals in GTP I to 38.75 million quintals by the end of GTP II 2019/20 (FDRE, 2016). To accomplish this goal the government of Ethiopia has promised to give all rounded support for domestic producers and selected foreign agricultural investors.

One of the constraints that hinder productivity of pulse crops is the availability of improved seed (Gete *et al.*, 2015). However, different stakeholders are trying to solve the problem. Seeds are provided by informal and formal seed systems. The informal system is a self saved seed or farmer to farmer seed exchange system and formally seeds are provided by government agencies and commercial organizations (Abebe, 2010). Among the government agencies, research centers and universities are trying to develop improved seed varieties. Hawassa and Haramaya Universities are working for the development of the sector. Hawassa University is the coordination center for common bean improvement program in the eastern and central Africa regional program and played its role in establishing its common bean crossing program for sources of germplasm to the eastern and central Africa regions bean network countries (Demelash, 2018).

### **Challenges**

Although pulses have many desirable characteristics in terms of nutrition and environmental benefits, in most parts of Ethiopia they are considered as secondary crops. As a secondary crop category pulses do not receive investment resources and policy attention as do for the cereal crops. Compared to cereal crops (teff, wheat, maize, barley, sorghum and millet), pulse crops not only receive less quantity of land resources, but also other inputs (Demelash, 2018). The use of irrigation, improved seeds, fertilizers and chemicals to control pests and diseases allocated for pulse crops are not satisfactory.

Gete *et al.* (2015) and Boere *et al.* (2015) individually explained productivity of pulses in Ethiopia appears to be severely constrained by four major factors, which are limited or no use of chemical fertilizers, improved seeds, limited use of conventional agronomic practices, and human factors such as access and control over resources. The limited availability of chemicals to control plant diseases and pests causes for low productivity of pulse crops, as Schneider & Anderson (2010) explained the most important biotic constraints facing pulse crop production in Ethiopia are mildew, rust and the wilt/root-rot complex. Water-logging, drought, poor management and lack of improved technology also limit productivity.

Seasonality of market and cultural practice are additional constraints limiting production of pulse crops in Ethiopia. For example consumption of haricot bean is considered as taboo in some parts of Ethiopia (Oromia region) as consumers perceive consumption of haricot bean causes abdominal discomfort like distension, flatulence and diarrhoea. Because of this perception farmers are not motivated to produce haricot bean (Alemneh *et al.*, 2017). The furthest distance from producers to main urban centers and seaports make small holder farmers less commercialized. Volatility of pulse prices, weak linkage between producers and export markets are challenges to Ethiopian pulse sub sector (Chilot *et al.*, 2010). Another problem is the limited availability of services for farmers and local traders. To obtain short-term loans the process is lengthy and the requirements are stringent. This causes producers and traders to use their own capital or obtain loans from informal money lenders (Broek *et al.*, 2014).

### **3. BENEFITS OF PULSE CROPS OVER THE CEREAL CROPS**

Pulses can play a significant role in improving smallholders' food security and as an affordable source of protein; they make up approximately 15 percent of the average Ethiopian diet and other essential nutrients (FAO, 2016 and Alemneh *et al.*, 2017). As a protein source, pulses are more affordable for smallholders than meat, fish, and dairy products, and for the 40 percent of Ethiopians who practice orthodox Christianity, pulses become the single largest source of protein during the fasting period. To our surprise, the protein content in beans can reach up to 40%, whereas the protein content of meat is approximately 20% which cannot easily be afforded by the poor farmers (Demelash, 2018). Pulses have a low fat content, contain zero cholesterol, and are a significant source of

dietary fiber. Moreover, they contain no gluten and are rich in minerals and vitamins, all of which are important for a healthy life (FAO, 2016 and Alemneh *et al.*, 2017). Pulses can have an income benefit for smallholders, both in terms of diversification and a higher gross margin than cereals. Pulses are generally more profitable than cereals (Broek *et al.*, 2014). An indirect benefit of pulse production is the crop residues, which are widely used as animal feed thereby supporting livestock an often important means of livelihood for smallholders (Abraham, 2015).

In addition to improving food and nutritional well-being, pulses can also improve soil health. Some pulse crops like haricot beans can be intercropped with the other crops like maize or cassava, thus they do not compete land resource for other cereal crops. Pulses have nitrogen fixing properties that can reduce fertilizer usage for cereals in the next season (FAO, 2016; Snapp *et al.*, 2018). They are important for sustainable agriculture, not only for the nitrogen fixation from the atmosphere but also because some species have the ability to mobilize soil-bound phosphorous, thus making it available for other crops. Additionally, in pasture, cropping and agroforestry systems, leguminous species promote higher rates of accumulation of soil carbon than cereals or grasses (Koroma *et al.*, 2016; SNAPP *et al.*, 2018). Given that cereal production causes higher soil nutrient depletion, rotating between pulses and cereal will not only contribute towards maintaining soil health but can also reduce the country's fertilizer consumption. In other words reducing utilization of inorganic fertilizer means reducing environmental pollution; thus pulse crops are climate smart crops.

Pulse crops are the third largest exported crop, thus they have a positive impact on the trade balance, and contribute to the country's foreign exchange reserves more than cereal crops. It is particularly noteworthy that pulses have a very low water footprint compared with other crops. Pulses extract water from a shallower depth, more water is left for the crops to be cultivated the next season and because pulses can improve the aggregation and structure of the soil, this can improve the water-use efficiency of these crops as well (FAO, 2016). Pulses can be grown in very poor soils where other crops cannot be cultivated. Pulses need less time period and moisture to grow and to be harvested than cereals. For example, farmers call haricot bean as a 'First Aid Crop' due to its early harvest. Farmers use the bean to sell and pay for the most urgent bills of school fees and credit taken from microfinance institutions or informal money lenders (Broek *et al.*, 2014).

### 3.1. Pulse Crops Value Chain Analysis in Ethiopia

#### Defining Value Chain

There is common to use the terms value chain and supply chain interchangeably but these terms are implying different things. Value chain is defined as the full range of value adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transportation or cooling, and ultimately response to consumer demand (Martin and Patrick, 2010); whereas supply chain is simply defined as a transfer of a commodity from one stakeholder to another in a chained manner. The value chain is the value addition at different stages of transfer. In different stages of value chain, different stakeholders add value to the product to increase the end product value. In other words, a value chain analysis looks at every step from raw materials to the eventual end user right down to disposing of the packaging after use. The goal is to deliver maximum value to the end user for the least possible total cost. Thus, supply chain management is a subset of the value chain analysis (Reddy, 2013). Value addition is simply the act of adding value to a product, whether the product owner have grown the initial product or not. It involves taking any product from one level to the next. For farmers, value-addition has a particular importance in that it offers a strategy for transforming an unprofitable commodity into a profitable one (Kent, 2005). Value chain analysis is the assessment of the actors and factors influencing the performance of an industry, and relationships among participants to identify the driving constraints to increased efficiency, productivity and competitiveness of an industry and how these constraints can be solved (Miller and Jones, 2010).

Value addition in pulses crops is motivated by the consumer demand such as the need for easy of transportation and storage, short cooking time, microbial safety and high quality foods. Food service sector also prefer quick cooking pulse products. Pulses are not consumed raw hence processed to improve the eating quality, digestibility and nutritional and health significance. Soaking, germination, cooking, roasting, germination and fermentation are commonly used processing techniques to make them edible. Soaking and germination help to eliminate the trypsin inhibitor activity, proteolytic enzymes inhibitors, phytates and tannins and increases the protein digestibility, bioavailability of mineral like iron and zinc (Alemneh *et al.*, 2017). Cooking pulses decrease the resistant starch and increased the carbohydrates, fat, level of bioactive compounds and antioxidant activity (Anjana, 2016).

#### 3.2. Pulse Crop Value Chain Actors and Their Roles

There are different chain actors operating at different levels of pulse crops value chain. Input suppliers, producers, assemblers, cooperative unions, retailer, whole sellers and exporters are the main actors in pulse value

chain (Rashid *et al.*, 2010; USAID, 2010). In Ethiopia, pulse's value chains are long with many middlemen and relatively high margins for intermediates (Broek *et al.*, 2014)

**Input Suppliers**

There are few private companies, cooperatives and government owned companies that import, produce and distribute fertilizers, improved seed varieties and other agrochemicals to producers.

**Producers**

Smallholder pulse producers sell their produce to rural assemblers, cooperative unions, grain wholesalers, retailers, and directly to consumers. In deciding how much to sell to the different actors, producers normally compare the different buying prices offered by each actor (USAID, 2010).

**Rural assemblers**

Rural assemblers obtain their market supplies only from producers. They particularly play an important role in moving small surpluses from producers in small village markets to major grain markets within their vicinity. They are unlicensed and may operate independently or as agents for wholesale merchants operating in the major markets. Assemblers sell their annual purchases to grain wholesalers, retailers and directly to consumers.

**Cooperative Unions**

In Ethiopia, there are many cooperative unions composed of several primary cooperatives, they are important actors in procuring cereals, pulses and oil seeds, depending on the type of crops grown in their respective areas. Cooperative unions buy products from producers and other smaller unions and they deliver their supplies to grain wholesalers and exporters.

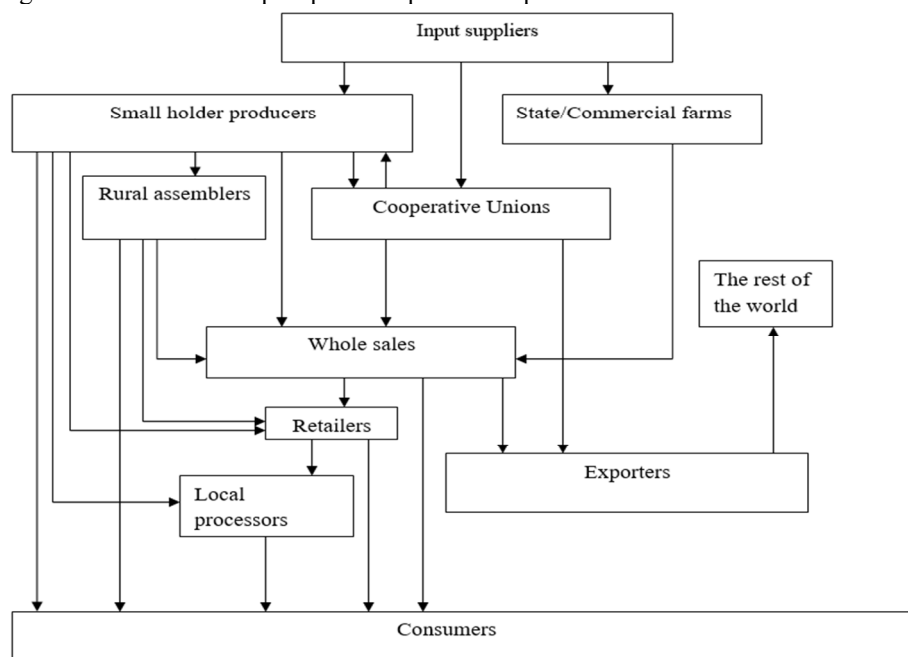
**Grain Wholesalers**

The grain wholesalers are licensed market operators and include wholesale merchants in surplus producing and deficit areas as well as companies and the government organizations. The role of the government in pulse marketing, however, is minimal. Thus, the major actors are the private wholesale merchants (USAID, 2010). Wholesale merchants obtain their supplies directly from producers, rural assemblers and cooperative unions. Large quantities of pulses purchased by the wholesale merchants in the surplus producing areas is sold to retailers in urban centers and deficit areas directly or indirectly through wholesale merchants operating in urban and deficit areas. Whole sellers also directly sold to consumers in their vicinity, exporters and to canned food manufactures.

**Exporters**

Exporters procure their supplies from wholesale traders, cooperative unions and rural assemblers. Before providing to final market exporters clean their product either using their own cleaning plants, or use the services of man power and then bagging it in standard bags. They also certify their product for quality and arrange for quarantine, transit and customs requirements. Pakistan, Kenya, Yemen, Vietnam, Russia, Indonesia, UAE, Vietnam, and Belgium, among others are the main export market destination of Ethiopian pulses (GAIN, 2018). The most important export pulses include haricot beans, chickpeas (large type), faba beans, lentils and field peas.

Figure5: Value chain map of pulse crops in Ethiopia



Source: adapted from USAID (2010). Staple Foods Value Chain Analysis, Country report Ethiopia



## Retailers

Both in rural and urban centers retailers play a crucial role in the distribution of pulses to consumers. The retailers purchase pulse crops from producers, collectors or wholesalers.

Licensed local retailers have a warehouse of their own. They store the product for between one and seven months anticipating price increases in the market. Those with limited working capital sell more frequently (Broek *et al.*, 2014).

Figure 5: Pulse Crops Value Chain Map

## Local processors

Local processors also called *Baltenas* obtain their supply directly from producers or from retailers and process pulses into flaked (or split), roasting and grinding (or milling) to make *shiro*. The flaked or the powder of lentil, field peas, faba beans and chick peas are an important component of Ethiopian dishes. The flaked beans are used to make fool (an important Arab breakfast dish).

## 4. CONCLUSION

Due to its richness in agro-biodiversity resulting from its geography and altitude, Ethiopia is potential grower of at least 12 types of pulse crops. The role of pulses can play for food security, as an affordable source of protein and source of income should be acknowledged. Pulses can bring higher income benefit for smallholders, both in terms of diversification and a higher gross margin profit than cereals. Pulses are known to be important soil conditioners because of their ability to fix atmospheric nitrogen and as a result, reduce the cost of farmers from chemical fertilizers and in turn this reduces environmental pollution.

Though the potential is there, the productivity and income derived from pulse crops haven't been fully exploited till now. Despite the country's potential and efforts made to get the pulse sub-sector moving forward, the sub-sector is constrained by less policy emphasis given by government, low allocation of factor inputs land, fertilizer and other agrochemicals to control plant diseases, limited use of improved seeds and agronomic practices. Actors in the value chain of pulse crops sub-sector have numerous challenges in production, aggregation, trading, and export. Solving these constraints faced by each actor in the sector will bring the pulse production at efficient level and the value addition maximized at each level. The issue is not only the concern of a single sector or actor. The policy makers, researchers, investors, exporters and producers should work together to facilitate the pulse crops sub-sector in Ethiopia.

## 5. RECOMMENDATIONS

In Ethiopia, the pulse sub-sector is constrained by so many factors. Improving the availability of chemical fertilizers (Phosphorus fertilizers), pesticides and insecticides, improved seeds, financial services may boost the volume of production and yield of pulse crops in Ethiopia. Enhancing the linkages between pulse value chain actors and providing adequate market to the exporters and farmers could increase the performance of the sector.

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