Current Situation and Future Outlooks of the Chickpea Sub-sector in Ethiopia

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1. Introduction

Chickpea is a less labor-intensive crop and its production demands low external inputs compared to cereals. In Ethiopia, chickpea is widely grown across the country and serves as a multi-purpose crop (Shiferaw *et al*., 2007). First, it fixes atmospheric nitrogen in soils and thus improves soil fertility and saves fertilizer costs in subsequent crops. Second, it improves more intensive and productive use of land, particularly in areas where land is scarce and the crop can be grown as a second crop using residual moisture. Third, it reduces malnutrition and improves human health especially for the poor who cannot afford livestock products. It is an excellent source of protein, fiber, complex carbohydrates, vitamins, and minerals. Fourth, the growing demand in both the domestic and export markets provides a source of cash for smallholder producers. Fifth, it increases livestock productivity as the residue is rich in digestible crude protein content compared to cereals.

Chickpea production works well in rotation with cereals such as wheat and *teff* widely grown in relatively well-drained black soils. Globally, chickpea is adapted to black soils in the cool semi-arid areas of the tropics, sub-tropics as well as the temperate areas. It is the third most important pulses gown in the world after dry bean and pea and constitutes 20% of the world's pulse production (Joshi *et al*., 2001). Chickpea was first produced in the Middle East about 7, 000 years ago. At present, it is produced in over 40 countries represented in all continents. However, the most important chickpea producing countries are India, Turkey, Pakistan, Iran, Mexico, Australia, Ethiopia, Myanmar, and Canada. Chickpea is currently grown on about 10.7 million hectares worldwide with average annual production of 8.2 million tonnes. About 95% of chickpea cultivation and consumption is in the developing countries.

There are two types of chickpea produced globally, namely *desi* and *kabuli* chickpeas. *kabuli* chickpeas have a larger cream-colored seed with a thin seed coat whereas the *desi* type has a smaller, reddish brown-colored seed with a thick seed coat. On average, world production consists of about 75% of *desi* and 25% of *kabuli* types (Agricultural and Agri-food Canada, 2004). Although *kabuli* types can be profitably adapted in the country, Ethiopia traditionally produces largely the *desi* types. Morphologically, *desi* types have

pink flowers while the *kabuli* types are characterized by white flowers. It is grown at the end of the main rainy season using residual soil moisture. This allows farmers to practice double cropping, which in turn increases productivity of scarce land resource and serves as an additional source of income.

This study aims to assess the current situation and outlook for chickpea in Ethiopia. The objective is to summarize the key features of the chickpea sub-sector and present some projections for the future of the chickpea economy in the country. The study benefits from reviews of various existing studies and analysis of secondary data, but presents a more coherent synthesis of the existing situation and outlooks for the future. The brief assessment is expected to be a simple reference for breeders and development agencies about the key features, constraints, intervention areas and opportunities for harnessing the chickpea sub-sector towards agricultural development in the country.

In order to present the key features in perspective, the study first presents the global scenarios focusing on world chickpea area, production, prices, and international trade (import and export of chickpea). Following this, the Ethiopian scenario is presented with a focus on available technologies, seed systems for technology diffusion and impact and market structures and constraints along the value chain. This is followed by presentation of future outlooks and opportunities and the final section concludes by highlighting key finding and issues for research and development policy.

2. Methods

Data used for this paper are primarily obtained from secondary sources such as FAOSTAT, published documents and various national reports. The secondary data comprised of aggregate data on global, regional and national production output, data on export and import volumes of chickpea, global and national chickpea price trends over years, and data related to access to seeds. The time series data used for this paper ranges from a minimum of 3 years to a maximum of 14 years.

We employed a number of statistical tools to analyze, summarize and present the data. For analyzing the historical trends over the years and estimate the growth rate, descriptive statistics are used. Two approaches are followed to project future outlooks for chickpea in

Ethiopia. First precedent growth rate which is obtained from a regression model is used to project future chickpea area and production. In this case, two scenarios are developed to project future outlooks for chickpea. In the fist scenario it is assumed that farmers will continue producing chickpea using their existing technology and methods of production. The second scenario assumes technological change as a result of adoption of improved varieties, especially the newly released *kabuli* types. The base year used for this analysis is 2008 and makes projections out to the year 2020.

The second approach used is a more robust quantitative modeling method to project plausible futures for chickpea area, production, yield, demand and net-trade as part of a global trade model. The global food projection modeling framework of IMPACT (the International Model for Policy analysis of Agricultural Commodities and Trade) recently calibrated and adapted for policy analysis of dryland crops is applied to examine the future situation for chickpea in Ethiopia. It uses the new and spatially disaggregated version of the model which allows supply, demand, and prices to be determined within each country and regional sub-models and linked at the global level through trade. Incorporating dryland crops such as chickpea into the IMPACT modeling framework however required extensive crop-specific data on area, production, supply, demand, trade and several associated parameters. For any specification of these underlying parameters, IMPACT generates projections for crop area, production, demand for food, feed and other uses, domestic and international prices and trade (import, export and net-trade). The version of the model used for this paper has a base year of 2000 and makes projections out to the year 2020. For detail information on the use of IMPACT model and projections for a wider range of crops, refer to Shiferaw *et al*., 2008.

3. Global chickpea production and trade

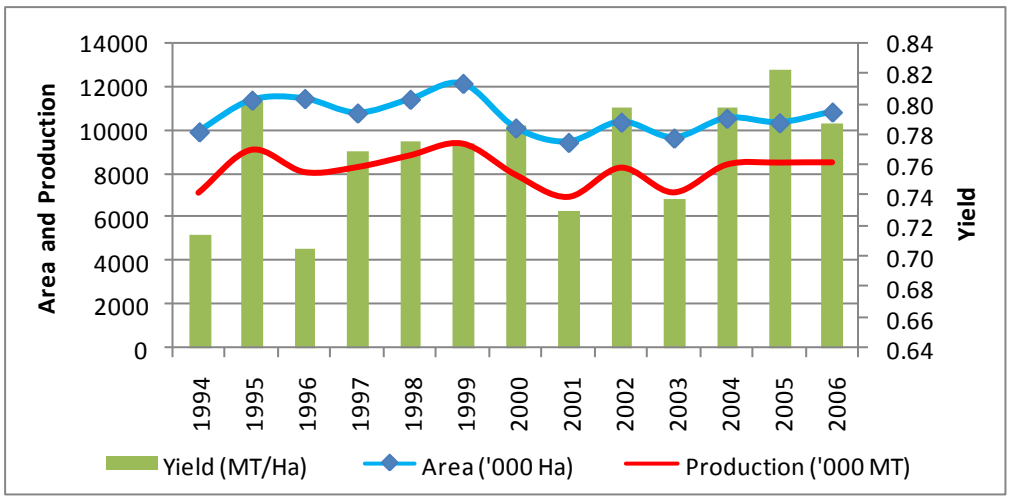
Between 1994 and 2005, worldwide chickpea was grown in about 10.7 million hectares with annual growth rate of 0.69% and coefficient of variation of 7.3%.[1] Compared to cereals and other crops, there have not been significant increases in chickpea yields. For the same period, annual increase in average yield was only 0.9% with a coefficient of

[1] The data for world chickpea outlook and situation analysis are derived from FAOSTAT database (www. faostat.org).

variation of 4.2%. This poor performance in yield increase was mainly attributed to low use of improved chickpea technology packages. For instance, in Ethiopia, of the total chickpea land (194, 981 ha) managed by smallholder farmers in 2001/02 season, less than one percent (0.69%) is planted with improved varieties (CSA, 2002).

The annual growth rate of world chickpea production during 1994-2005 was about 1.87%. The upward trends have been characterized by year to year variability with a coefficient of variation of 9.4%, typical of rain fed crop. The increase in area and yield, although marginal, contributed to the increase in production. There is high correlation between production and area (90%) and production and yield (68%). The above analysis indicated that in the past thirteen years (1994-2006), the overall growth in area, production and productivity was almost stagnant ranging between 9 to 12 million hectares, 7 to 9 million tonnes and 713 to 802 tonnes per hectare. A similar result is depicted in Figure 1. However, there is an opportunity to increase productivity per unit area through diffusion of appropriate and affordable chickpea technology packages and complementary inputs such as irrigation since most of the chickpea is grown in receding soil moisture, which may not be enough during drought seasons.

Figure 1: World chickpea production trends



Source: FAOSTAT

Country wise, India is the largest producer of chickpea accounting for 66% of global chickpea production and 63% of cultivated area. The average area and production share

of major chickpea producing countries for the period 1994-2005 is presented in Figures 2 and 3.

Figure 2: Chickpea area share of major producing countries during 1994-2006

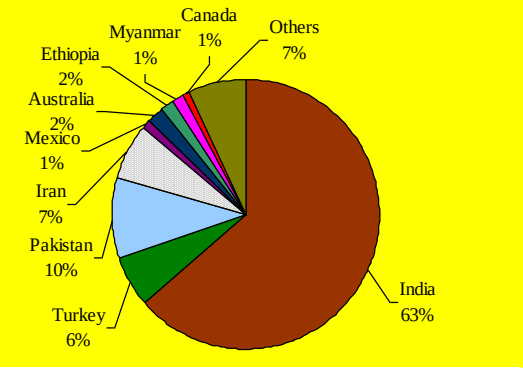
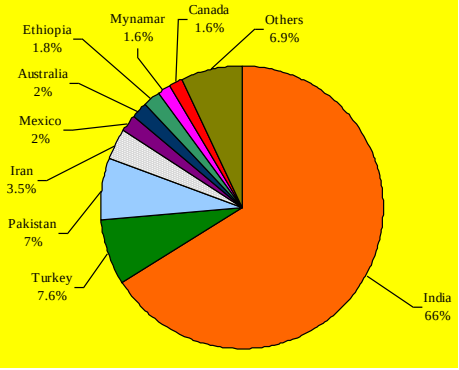


Figure 3: Chickpea production share of major producing countries during 1994-2006



Source: FAOSTAT

3.1. Chickpea import and export trends

International trade in chickpea is negligible compared to other agricultural commodities. Although there is a positive export and import growth rate of 9.4% and 15.4% respectively during 1994-2005, the marketed volume is only 8.7% of the total average production (8,177 thousand tonnes) while more than 92% of the chickpeas are consumed in the countries where they are produced. The international trade variability is high compared to production variability. The coefficients of variation of export and import during 1994-2006 are 28% and 35%, respectively. Major chickpea exporters are Turkey, Australia, Mexico, Iran and Canada (see Fig. 4). The top three exporting countries (Australia, Turkey and Mexico) accounted for 53% of exports. The main chickpea importing countries are India, Pakistan, Spain, Bangladesh, Algeria, United Arab Emirates, and Italy (see Fig. 5). Unlike exports, imports were not concentrated on a few countries but distributed widely, with the top seven countries accounting for 64.3%.

Figure 4: Average chickpea export share by major exporting countries during 1994-2005

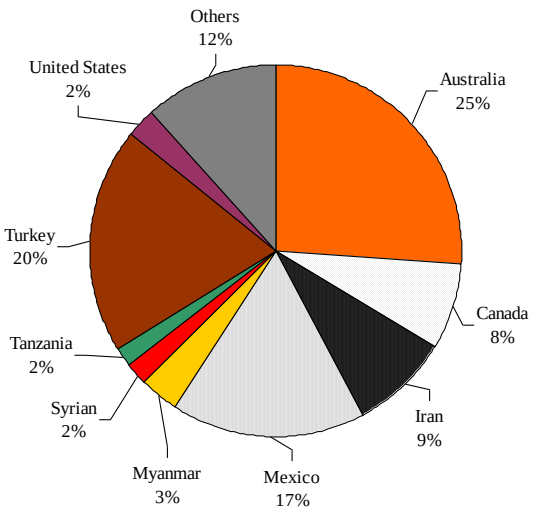
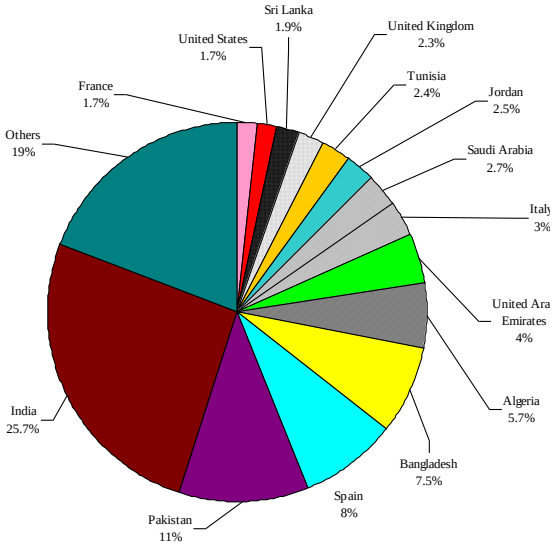


Figure 5: Average chickpea import share by major importing countries during 1994-2005



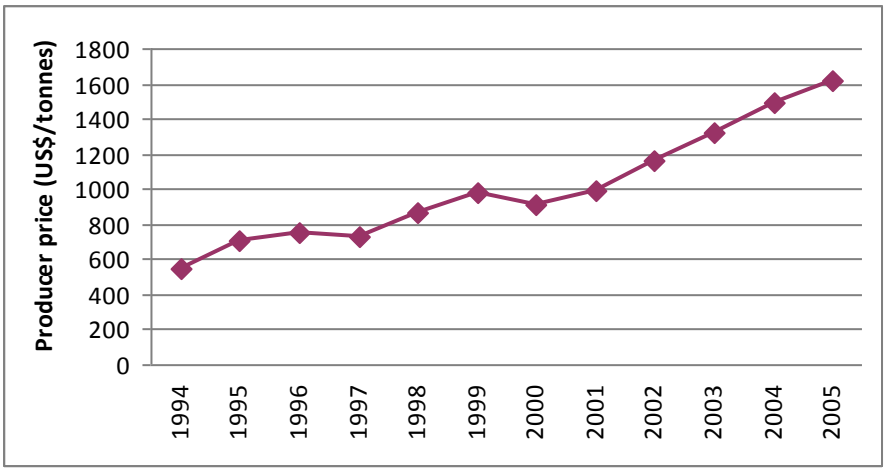
Source: FAOSTAT

Turkey and Canada produce about 50% of *kabuli* type of chickpea and export it. The major importing countries like India, Pakistan and Bangladesh import *desi* type, whereas developed countries, the Middle East, and Northern Africa import mainly the *kabuli* type (Agricultural and Agri-food Canda, 2004).

3.2. Chickpea producer price trends

Though prices are not differentiated by chickpea types and grain size, chickpea price shows upward trends (see Fig. 6) with average annual growth rate of 10.8%. This is a good opportunity for producers to adopt improved technologies even though there is a trade off as it might affects negatively rural net buyers and urban consumers (e.g. current world food crisis). The upward trends have been characterized by high year-to-year variability with a coefficient of variation of 31.5%.

Figure 6: World chickpea producer price trends (1994-2005)

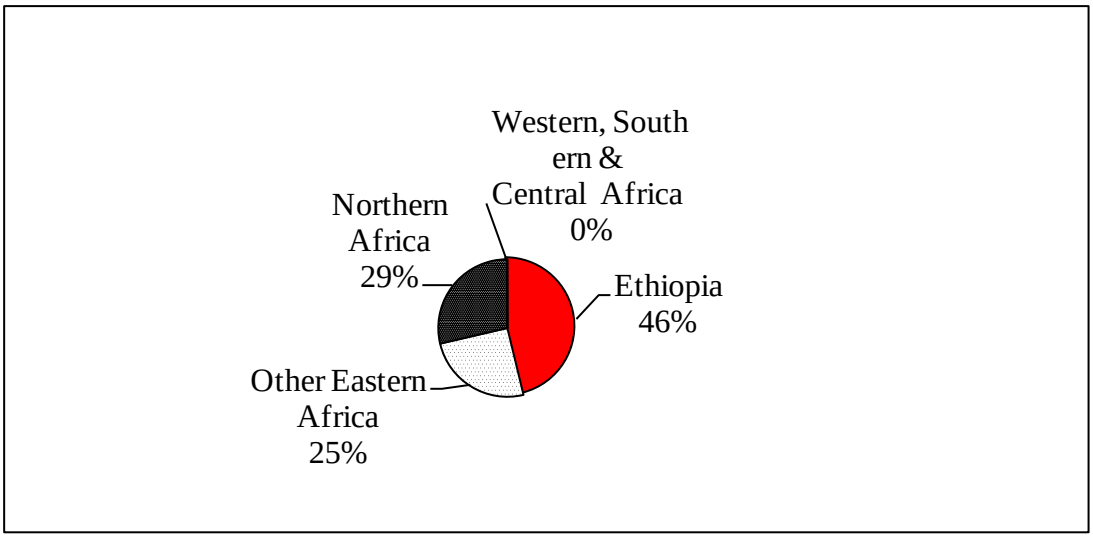


Source: FAOSTAT

4. Chickpea sub-sector in Ethiopia

In Ethiopia, the earliest finding of chickpea is reported in 1520 BC (Joshi *et al*., 2001). Ethiopia is the largest producer of chickpea in Africa accounting for about 46% of the continent's production during 1994-2006 (see Fig. 7). It is also the seventh largest producer worldwide and contributes about 2% to the total world chickpea production (see Fig. 2).

Figure 7: Ethiopian chickpea production share in Africa (1994-2006)



Source: Computed based on FAOSTAT

Chickpea, locally known as *shimbra*, is one of the major pulse crops (including faba bean, field pea, haricot bean, lentil and grass pea) in Ethiopia and in terms of production it is the second most important legume crop after faba beans. It contributed about 16% of the total pulse production during 1999-2008 (see Fig. 8). The total annual average (1999-2008) chickpea production is estimated at about 173 thousand tonnes. During the same period, chickpea was third after faba beans and field peas in terms of area coverage (Fig. 9).

Figure 8: Average chickpea contribution to total pulse production during 1995-2008

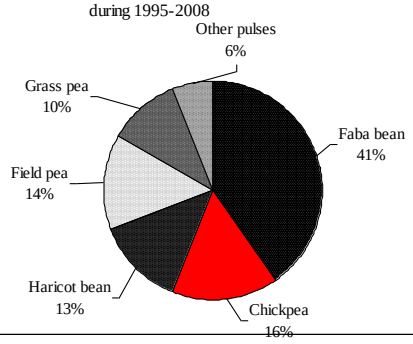
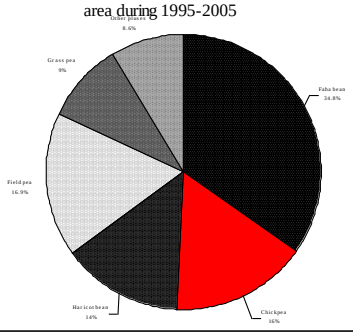


Figure 9: Chickpea area share from total average pluse cultivated area during 1995-2005



Source: Computed based on CSA (various reports)

4.1. Area and production trends

Chickpea production and cultivated area are steadily increasing over the years 1999-2008 (see Figs. 10 and 11).

Figure 10: Pulse crop production trends in Ethiopia (1995-2008)

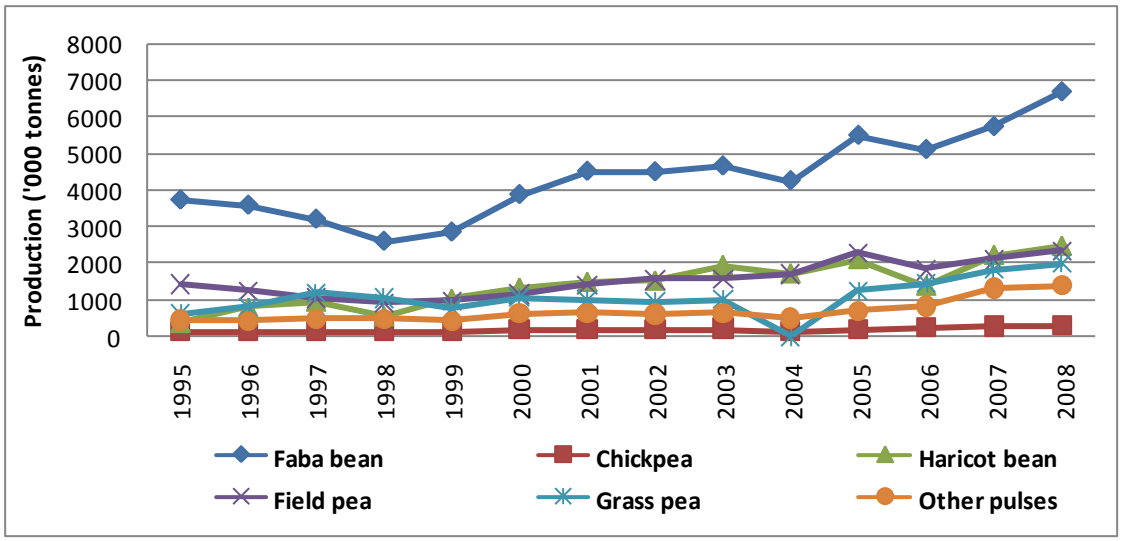
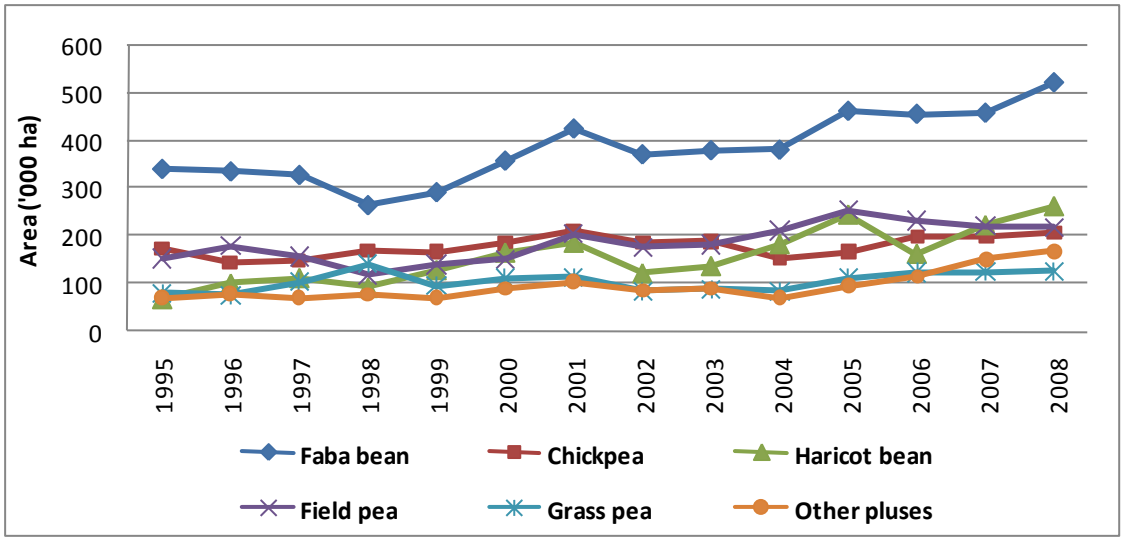


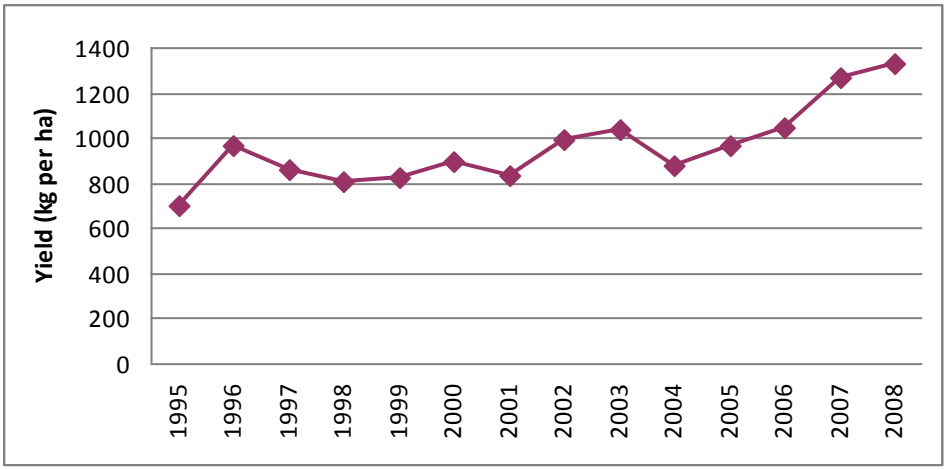
Figure 11: Cultivated area under pulse production during 1995-2008



Source: Computed based on CSA (various reports)

The average annual growth rate in area and production showed that cultivated area under chickpea and production of chickpea increased by 2.1% and 7.6%, respectively during the same period. The production growth rate is relatively higher compared to faba beans (5.7%). Grain yield of chickpea has also showed upward trends, particularly starting from the year 2004 and onwards (Fig. 12), with an average annual growth rate of 5.9%. Most of the chickpea is cultivated under rain fed conditions.

Figure 12: Chickpea yield trends in Ethiopia (1995-2008)



Source: Computed based on CSA (various reports)

4.2. Available technologies

At present the use of improved chickpea production technology packages is negligible. Over the last three decades (1974-2005), 11 improved chickpea varieties (six *kabuli* and five *desi*) were released in Ethiopia (see Annex 1 for chickpea varieties released and their economically important traits). However, the adoption rate of these varieties is very low. Official estimates from the Central Statistics Authority (CSA) show that, of the total chickpeas cultivated area (194,981 ha) only 0.69% was covered by improved chickpea seeds in 2001/02 (CSA, 2002). The main reasons indicated for low adoption rates are insufficient seed production and marketing systems that limit the availability of quality improved seeds, lack of credit, late delivery, and theft during the green stage (Byerlee *et al*., 2007; Shiferaw *et al*., 2007). As described below, the government completely controls the seed industry, even though parastatal seed production and distribution has usually proven to be an ineffective system of seed supply. Solving these institutional, infrastructural and social constraints can speed up adoption of improved chickpea varieties.

4.3. Chickpea producing areas

Although chickpea is widely grown in Ethiopia, the major producing areas are concentrated in the two regional states - Amhara and Oromia. These two regions cover more than 90% of the entire chickpea area and constitute about 92% of the total chickpea production (see Figs. 13 and 14). The top 9 chickpea producing zones (North Gonder, South Gonder, North Shewa, East Gojam, South Wello, North Wello, West Gojam, Gonder Zuria) belong to the Amhara region and account for about 80% of the country's chickpea production (see Annex 2a for chickpea area and distribution by zone).

Figure 13: Region's average chickpea cultivated area share during 1999-2008

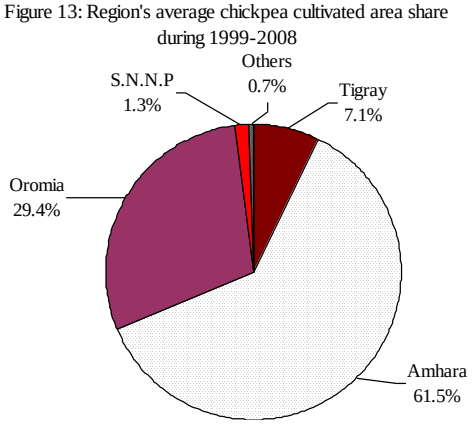
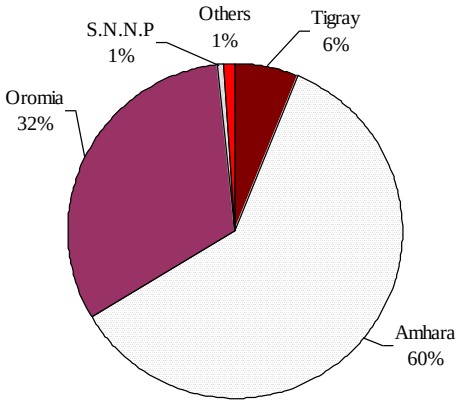


Figure 14: Region's average chcikpea production share during 1999-2008



Source: Computed based on CSA (various reports)

In the Oromia region, the major producing zones are in West Shewa, East Shewa and North Shewa, which account for about 85% of the total area and production in this regional state. A summary map indicating the major chickpea growing areas of the country is given in Annex 2b.

4.4. Chickpea seed systems

Generation and transfer of new technology are critical prerequisites for agricultural development particularly for an agrarian based economy such as Ethiopia. Seed, especially that of improved varieties, is an essential input for increasing crop productivity. This suggests the need to place much emphasis on sustainable and efficient seed systems.

Van Amstel *et al.* (1996) defined the seed system as '*the sum of physical, organizational and institutional components, their actions and interactions that determine seed supply and use, in quantitative and qualitative terms*'. Two distinctive but interacting seed delivery systems are now recognized: the formal and informal sectors. The informal seed system deals with small quantities of seed, is semi-structured, operates at the individual farmer or community level (Cromwell *et al*., 1992), and may depend on indigenous knowledge of plant and seed selection, sourcing, retaining and management, as well as local diffusion mechanisms (Bishaw, 2004). The informal sector is more flexible and adaptable to changing local conditions and less dependent on or less influenced by other

external factors. The informal system comprises a multitude of individual private farmers who select and save their own seed or exchange seed with others through traditional means such as gift, barter, labor exchange, cash transactions or social obligations as well as a diversity of local level seed production initiatives organized by farmers' groups and/or NGOs working under no legal norms and certification schemes of the organized seed sector (Ibid).

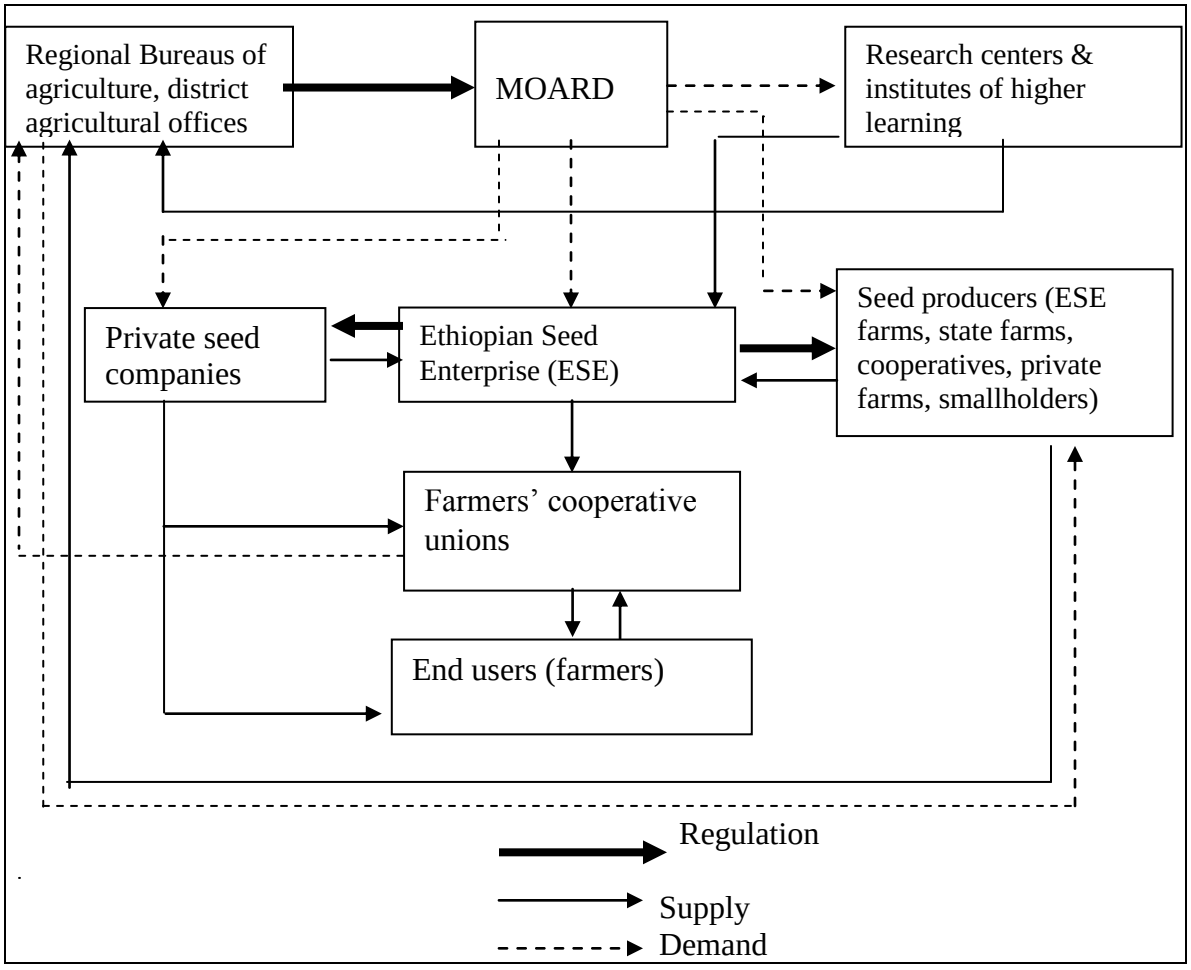
The formal seed system is composed of institutional and organizational arrangements consisting of all enterprises and organizations that are involved in the flow of modern varieties from agricultural research to the farming communities. These include several interrelated components such as variety development, release and registration, seed multiplication and processing, seed quality control and certification, and seed marketing and distribution. The formal system comprises of public and/or private plant breeding institutions, parastatal, private seed companies, seed certification agencies, and agricultural input distribution agencies/cooperatives operating within a specified national seed policy and regulatory framework.

In Ethiopia, the two seed systems (sectors) are operational. The informal seed systems (self-saved seed or farmer-to-farmer seed exchange) accounts for 90% of the seed used by smallholder farmers (Belay, 2004). These are cost-effective systems and are fully adequate in many cases, especially in hard-to-reach areas. This local production and distribution facilitates maintenance of crop bio-diversity by preserving *in situ* locally adapted varieties and by broadening the genetic base of production with multiple varieties adapted to specific micro-climates and production system. Despite its vital contribution this sector is not adequately linked into institutional sources for improved seed. Until the 1970s, formal breeding and seed multiplication activities were conducted on an ad-hoc basis. In 1976, the National Seed Council was set up to formulate recommendations for organized seed production and supply of modern varieties released from the national programmes (Belay, 2002). The Ethiopian Seed Enterprise (ESE) was established in 1979 as a fully government-owned parastatal to undertake seed production, processing, and distribution, while regulatory functions were managed by the Ministry of Agriculture and Rural Development (MOARD).

The formal seed system was and still is used as a major source for disseminating new varieties (technology transfer channel) obtained from the Ethiopian Institute of Agricultural Research, International Agricultural Research Centers and a number of regional research centers and higher learning institutes in the form of basic (foundation) seed or breeding lines. The ESE produces, processes, distributes, and markets improved seed including chickpea based on the official demand projection of the regional bureaus of agriculture. ESE is the only public seed enterprise responsible for production of seed for all crops (cereals, pulses, fruits, vegetables and forage), although its seed production is dominated by cereals, especially maize and wheat. ESE produces seed on its own farms and through contract with public and private farms, cooperative unions, and smallholder farmers. The framework of the formal seed system is presented in Figure 15. This system equally applies for chickpea seed production and distribution.

The ESE follows the same production and marketing system for chickpea as in cereal crops. The ESE gets chickpea breeder seeds from the national agricultural research centers to produce pre-basic and basic or foundation seed on its own four farms located in different regions**.** It then sells the foundation seed to individual farmers and cooperatives for multiplication of certified seed that is sold to the agricultural office and cooperatives too for distribution in different regions. For detail production and marketing of improved chickpea varieties refer to Jones *et al*. (2006).

Figure 15: Formal seed system Framework in Ethiopia



Source: Adopted from Alemu *et al*. (2007)

At present, the private sector is a limited force in Ethiopia's seed market. In 2004, although there were 26 firms licensed to produce seed, 33 to retail, and four to export seed, only eight firms were active in seed production. This lack of private involvement could be seen even in the hybrid maize seed sector, which has been largely privatized in many other low-income countries. In Ethiopia, as of 2004, approximately 70% of maize seed was produced by the ESE, while the remaining 30% was produced by Pioneer Hi-Bred International and a handful of smaller firms under contract to ESE. For other crops, the ESE is the only formal producer of seed (Alemu *et al*., 2008). Locally operating international NGOs such as World Vision, CARE, and Catholic Relief Service—are also involved in the production, marketing, and distribution of maize seed through a variety of

community-based projects such as local seed banks and on-farm seed multiplication projects.

The state-controlled seed system is characterized by limited production of crops and varieties, unreliable seed quality, and late delivery (Byrelee *et al*., 2007). For instance during the 2004/05 season, the supply of improved varieties channeled through the formal system fell short of the estimated demand from the regional bureaus of agriculture by 73% (see Table 1) (Ibid).

Table 1: Demand and supply for seed during the 2005 cropping year

Crop types	Demanded quantity (tonnes)	Supplied quantity (tonnes)	Supply as a percent of demand
Chickpea	4,819	2,641	55
Faba bean	7,773	476	6
Haricot bean	3,374	703	21
Wheat	51,849	10,628	20
Maize	15,522	8,246	53
Barely	7,084	1,163	16
Teff	7,839	420	5
Sesame	2,177	605	28
Total	111,760	30,404	27

Source: Based on Byrelee *et al*., (2007)

The very limited numbers of private seed enterprises and the low attention accorded to the informal seed sector aggravated the seed supply crises and narrowed the options available to farmers for obtaining good quality planting materials of modern varieties at affordable prices, at the right place and time.

A more flexible seed system which is sustainable (both financially and institutionally), that meets the seed needs of a diverse group of farmers, and reduces the current seed supply crises is crucial in Ethiopia to accelerate agricultural growth and commercialization to reduce poverty and enhance food security. This requires lifting the entry barriers for participation of the private seed industry and encouraging the growth of

the informal sector by providing adequate access to basic or foundation seed and extension advice on seed production, processing, treatment and storage. Community based seed production and marketing systems like quality declared seed (QDS) which is tested in Tanzania for dissemination of truthfully labeled seed of high quality could be one strategy for easing the seed shortage problem, especially for open-pollinated cereals or self-pollinated legumes like chickpea. The private sector lack the incentive to participate in the enhanced delivery of seeds of these crops as the size of the market is small and farmers are able to use saved and recycled seed for 3-5 years.

Strengthening the on-going farmer based seed production program and revolving seed scheme by improving farmers' skills in seed multiplication can assist in increasing the supply of seed for improved varieties both within communities and to the formal seed system. The revolving seed scheme where target farmers often organized into groups or cooperatives access a certain amount of seeds of improved varieties from a supplier (e.g. NGO or ministry of agriculture) and return at least the same amount of seed in-kind is an important mechanism in the absence of adequate supply of improved seeds to reach all farmers. Currently, the scheme is run for disseminating improved varieties by the district agricultural offices although there is a possibility to involve cooperatives. This scheme was initially proposed for forage seeds distribution but recently grain seeds are also distributed through this system. This system unlike the formal seed system does not involve many transactions. The great advantage of this system it that it benefits resource-poor farmers who may otherwise have poor access to or lack adequate cash to buy seed from the formal seed system.

The revolving seed scheme is relevant for chickpea research and development projects for the following reasons. First, the existing parastatal seed system focused more on the production and marketing of cereals. Second, the seed rate for chickpea (100 kg per ha) is high compared to cereals which may not be affordable by resource-poor farmers to buy from the formal seed system. Third, it can be easily available to farmers on time unlike the formal seed system currently characterized by late delivery and market failures. One of the key challenges for the revolving seed scheme is the administrative costs involved to ensure timely repayment or delivery of quality seed of the same variety. The participation of the local government bodies and farmer groups seems to address this

problem as peer-pressure and local monitoring of participants is critical to ensure compliance and timely distribution of the seed to other farmers.

5. Chickpea marketing systems

5.1. Structure of chickpea markets

The chickpea marketing system in the country is very complex, linking a number of actors as the grain moves from the producer to the consumer or end-user. The number of links in the market chain reflects the services that are required to deliver chickpea to the different consumers and end-users. Despite the length of the marketing chain, the structure of the chickpea markets shows limited transformation or value addition that takes place as the grain moves within a given marketing chain. The bulk of the chickpea grain is transacted in unprocessed form. This suggests that, beyond transport and limited storage, relatively few market services are provided by intermediaries, indicating a relatively unsophisticated market structure. While the overall structure of the marketing system is quite complex, few major marketing channels (value chains) linking producers with different end-users have been identified (Shiferaw and Hailemariam, 2007):

i) Channel 1: Rural retailers channel
ii) Channel 2: Assembler to wereda[2] retailer channel
iii) Channel 3: Assembler to urban retailer channel
iv) Channel 4: Assembler to processor channel
v) Channel 5: Assembler to supermarkets channel
vi) Channel 6: Assembler to exporter channel
vii) Channel 7: Wereda wholesaler to exporter channel
viii) Channel 8: Farmers union to exporter channel
ix) Channel 9: Farmers union to processor channel

These nine marketing channels represent the full range of available outlets through which the grain moves from the primary and secondary markets in rural areas to domestic

[2] Wereda is an administrative division of Ethiopia (managed by a local government), equivalent to a district. Weredas are composed of a number of *kebele*, or neighborhood farmer associations, which are the smallest unit of local government in Ethiopia.

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consumers and grain exporters to meet end-user needs in foreign markets. The rural retailers handle only a small volume of the total marketed surplus of mainly *desi* types. They collect directly from farmers and retail it to rural consumers in village shops, making this channel to be the shortest chain in the marketing system. The rural consumers include those engaged in non-agricultural activities and farmer net buyers of chickpeas (mainly those who do not grow the crop). The rural assemblers, who collect the largest proportion of both *desi* and *kabuli* produce from farmers, are critical players in feeding alternative marketing channels. Most of the processed and packed chickpea sold in the supermarkets so far is prepared from *desi* types. This seems to be showing changes as some supermarkets have already started selling unprocessed and processed *kabuli* chickpeas to domestic consumers. The wereda wholesalers are also important as they procure some of the produce from farmers and channel this to processors and exporters. The farmers union is another player in the market with its own marketing chain extending from the primary cooperatives to processors and exporters. The length of the chain and the number of links in the value chain depend on the distance between the assemblers and the final outlet to the consumer or the exporters.

Marketing of chickpea generally starts with the collection of grains from the farm-gate and village markets (primary markets) moving on to the district towns (secondary markets) and then on to terminal markets in the cities. In the marketing chain the product passes successively through a number of market actors (representing the links in the value chain) before it reaches the end user. Broadly, there are two types of wholesalers in chickpea marketing in Ethiopia. These are wholesalers at district level towns and wholesalers operating at the tertiary markets including the parastatal, the Ethiopian Grain Trade Enterprise. Previously, wholesale chickpea trade was largely controlled by the public enterprises, mainly by the Ethiopian Oilseeds and Pulses Exporting Corporation. However, following the liberalization of grain market system in 1990, the role of public enterprises significantly diminished and the role of private wholesalers increased. Market survey results indicated that wholesale markets both at the secondary and terminal levels are the main assembly centers for chickpea grains in their respective surrounding areas (Shiferaw and Hailemariam, 2007). Almost every trader has a warehouse in the market either self owned or on a rental basis. There is also an easy access to transport, which

makes it well-located both for producers and other traders to move chickpea grain from one market to the others. Almost all wholesalers have at least one cellular phone, highly beneficial in conducting their buying and selling activities through a range of contacts they have in different markets.

Usually, speculative storage to benefit from inter-seasonal price movements is rarely practiced because of poor liquidity and high storage risks. Chickpea transaction from the district level wholesalers to urban wholesalers, processors and exporters is usually facilitated by arbitrage of brokers so as to coordinate inter-market chickpea flow usually based on trust. Similar to other grain marketing practices in Ethiopia, brokers identify chickpea buyers, sell chickpea on behalf of district level wholesalers and collect and send back money from the sale of chickpea. The market intermediaries communicate market information back to their clients on a regular basis.

Today Ethiopia also has several Farmers Unions and Primary Cooperatives involved in chickpea and other grain trading activities. The farmers unions facilitate access to improved seed, other inputs and credit to farmers. Recently, some of the Farmers Unions have started selling grain to wholesalers and exporters.

There are also a few large scale and medium level mills that process chickpea mainly in the tertiary market. For example, two large scale processors, East Africa and Green Star are located in Ada-Liben district. Although most of the large scale processors need *desi* type chickpeas, the newly established canning factory, Green Star Food Company, also requires *kabuli* chickpea for processing. This is expected to be a good market opportunity for farmers in the surrounding area to increase *kabuli* production. Another processing plant located at the outskirts of Dukem town in Akaki district is Arba and Tryaki Grain and Pulse Industry currently using lentils, grass pea (Lathyrus sativus) and *Desi* chickpea for processing mainly for export to Turkey. The Arba and Tryaki Grain and Pulse Industry is not currently using *kabuli* chickpeas, suggesting the need to pilot such a program to stimulate local processing and value addition that may expand and diversify markets for *kabuli* chickpea. Recently, lack of trust and collaboration between the farmers and the Green Star processing company has however affected the supply of *kabuli* chickpeas to the factory.

On the other hand, almost all of the medium and small scale processors (locally known as *baltina*) are found in the tertiary markets and their number is comparably higher than that of large scale processors. They require both *desi* and *kabuli* chickpeas, although their demand for *desi* is relatively higher. Almost all of them have more than one selling point in and outside Addis Ababa. In addition, most of their products are available in most supermarkets and directly sold to consumers through small outlets in urban areas.

There are also some grain exporting private and government owned companies. None of the exporters specialize in chickpea trade. Some of the exporters also engage in multiple businesses including wholesaling and retailing of grains in the domestic market. Because of the limited availability of *kabuli* chickpeas in the markets very few exporters handle *kabuli* types. Recent market studies show that *desi* type chickpea comprised about 82% whereas *kabuli* type chickpea comprise the remaining 18%. The increased availability of small-seeded *kabuli* chickpea is not however going to make Ethiopian exporters competitive as domestic prices are high while prices for small-seeded *kabuli* in international markets are very different from *desi* chickpeas. This is especially the case in south Asian markets which are very sensitive to prices than quality at this time.

5.2. Markets and grain quality

A recent market study found that traders at all market levels classify chickpeas into three informal grades, although the third chickpea grade was recognized by fewer respondents especially in the primary and secondary markets (Shiferaw and Hailemariam, 2007). About 75% of traders recognized *kabuli* chickpeas as having two grades (Grade 1 and 2). There is uncertainty about the number of valid quality grades for *desi* types. For *desi* chickpea, the majority of the sample traders in the primary markets (70%) recognized only one quality grade for the commodity.

The study also looked at the market traits that are important in determining quality grades for chickpeas. The major quality traits used in markets to classify chickpea grades include grain color, grain size, presence of foreign matter and broken and shriveled seeds. For *kabuli* chickpea, the highest quality grade requires about 98% white color grain, 96% large seeded grain, and less than 4% foreign matter and 4% shriveled and broke grain.

On the other hand, the second quality grade prescribes about 96% white colored grain, 91% large seeded grains, and less than 5% foreign matter and 5% shriveled and broken grains. This indicates that *kabuli* grades drop when the proportion of white large seeded grain decreases and the proportion of foreign matter and shriveled and broken grain increase.

For *desi* chickpea, the requirements for the first quality grade are about 94% red color grain, 96% large seeded grain, and not more than 6% foreign matter and less than 6% shriveled grain. The second grade on the other hand requires about 80% red color grain, 90% large seeded grains, and not more than 8% foreign matter and shriveled and broken grains. There seems to be overall awareness about what matters for quality, but much less is known on how such grades relate to prices. This is unlike the case of major staple crops like teff where the consumers and traders alike generally know about the different grades and the associated prices.

This quality classification of chickpea is actually based on visual observation and it does not include any of the hedonic characteristics of the product. In many cases, visual inspection of the product is needed to determine the quality standards, which often requires the presence of the trader or his/her agent at the point of transactions. The traders usually take random samples from a given consignment using a special sampling device, which can be inserted into sacks and check for the major market preferred traits before they set their offer prices. While the Quality and Standards Authority of Ethiopia has established three quality grades for chickpea, much less is known on how the informal classification of chickpea grades based on grain size and color conforms to these standards. Even though the quality characteristics of traded chickpea do not always conform with the formal standards and requirements, the market still considers and gives weight for some of the quality parameters than the others.

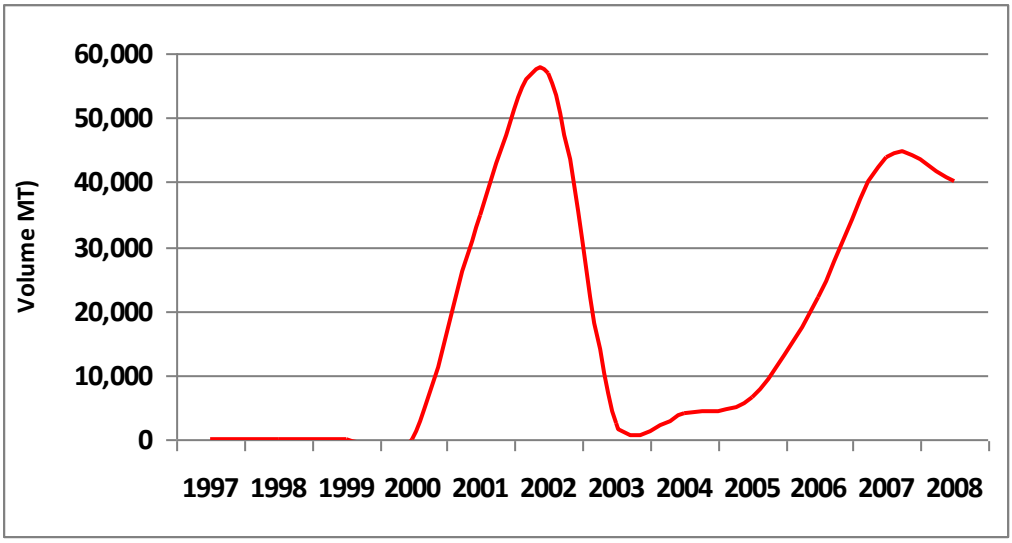
Compared to primary markets, secondary and tertiary markets had the highest proportion (about 80%) of *kabuli* chickpea rated to be grade one while primary markets had most of the chickpea in grade two categories (Shiferaw and Hailemariam, 2007). This may indicate some divergence on how the same grain is rated into different quality grades in the different markets, where primary markets generally under value quality. Quality grades will not have any relevance if market prices do not reflect such differentiation.

The survey results indicate that at all market levels (except for *desi* in primary markets) quality seems to attract a price premium. On average, there was a margin of about 27 birr/100 kg for *kabuli* chickpea and 15 birr/100 kg for *desi* chickpea. Interestingly, the level of significance of quality increases substantially in the tertiary market than the other markets. The price differential between grades in this market for *kabuli* chickpea reaches up to 72 birr/100 kg. The effect of quality on prices is much lower in the primary markets than in the secondary and tertiary markets.

5.3. Chickpea exports and price trends

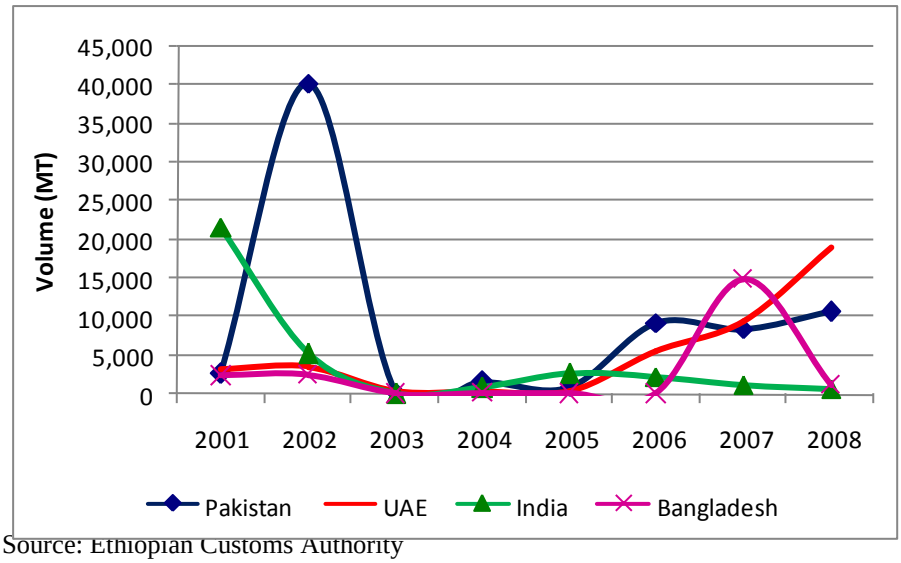
Though Ethiopia is the largest producer in Africa and seventh largest producer in the world, its participation in the international market (import and export) is negligible. Over 80% of the total chickpea production is traded in the domestic market using various market outlets (Shiferaw *et al*., 2007). For example, of the average production for 1997-2007 of 171,011 tonnes, the country's average export amounted to about 9.1% (or 15,532 tonnes) of total production. Ethiopia's chickpea export volume is characterized by high levels of fluctuations from year to year. Export was negligible between 1997 and 1999 but reached 19.9% and 30.4% of the total production, respectively, for the years 2001 and 2002. It again declined between 2003 and 2006 but peaked again to 23.15% in 2007 (Fig. 16). Chickpea production and marketing (local and export) are dominated by *desi* types. Ethiopian *desi* chickpea is exported to South Asia, Middle East, North Africa, North America, Europe, Southeast Asia, and Latin America (see Fig. 17 and Annex 3 for quantity exported to these countries during 2004-2006). According to FAOSTAT, the country imported (250 tonnes) only once during the period 1994-2005 as part of the drive to introduce seeds of new varieties from abroad.

Figure 16: Chickpea export trends in Ethiopia



Source: Customs Authority of Ethiopia

Figure 17: Major importers of Ethiopian chickpea

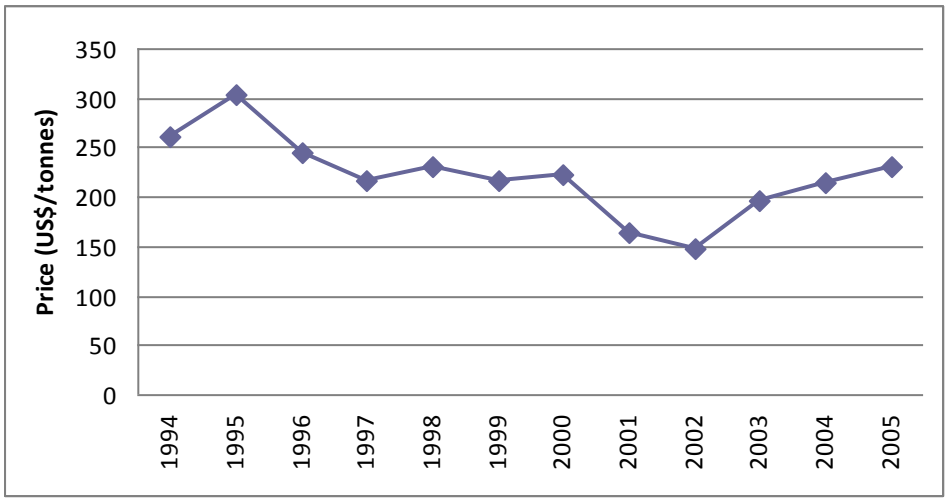


Source: Ethiopian Customs Authority

5.4. Chickpea price trends in Ethiopia

From 1995 through 2001, the producer price trend was downward, however there is an upward moment of prices since 2002 (see Fig. 18). In general, it has a positive annual average growth rate of 0.12% and coefficient of variation of 18%.

Figure 18: Chickpea producer price trends (1994-2005)



Source: Computed based on FAOSTAT

The FAOSTAT database does not differentiate prices by chickpea types. Using market information from one of the spot chickpea growing areas (Deber Zeit) in Ethiopia, *kabuli* and *desi* chickpeas producer and retail price trends are explored. Figure 19 and 20 shows that both producer and retail price are higher for *kabuli* chickpea than for *desi* types. The retail price movement is much steeper than the producer price. Retail price is more variable than producer price. The coefficients of variation are 21% and 37% for *kabuli* and desi retail price, respectively. On the other hand, the coefficients of variation for *kabuli* and desi producer price are 12% and 20%, respectively. The annual average growth rate (AAGR) of *kabuli* retail price (4.5%) is more than doubled compared to *desi* retail price (2.3%). On the contrary, the AAGR of *desi* producer price (3.68%) is much higher than *kabuli* producer price (0.37%).

Figure 19: Monthly average Kabuli and Desi producer price trends in Deber Zeit (Feb 2006-Jan 2008)

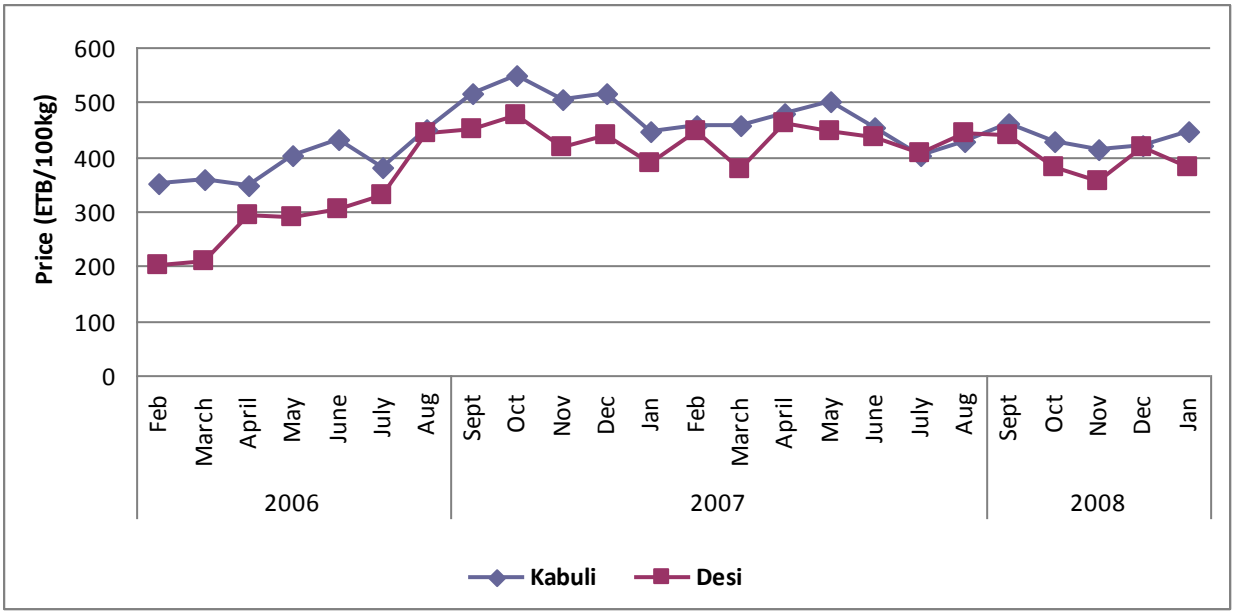
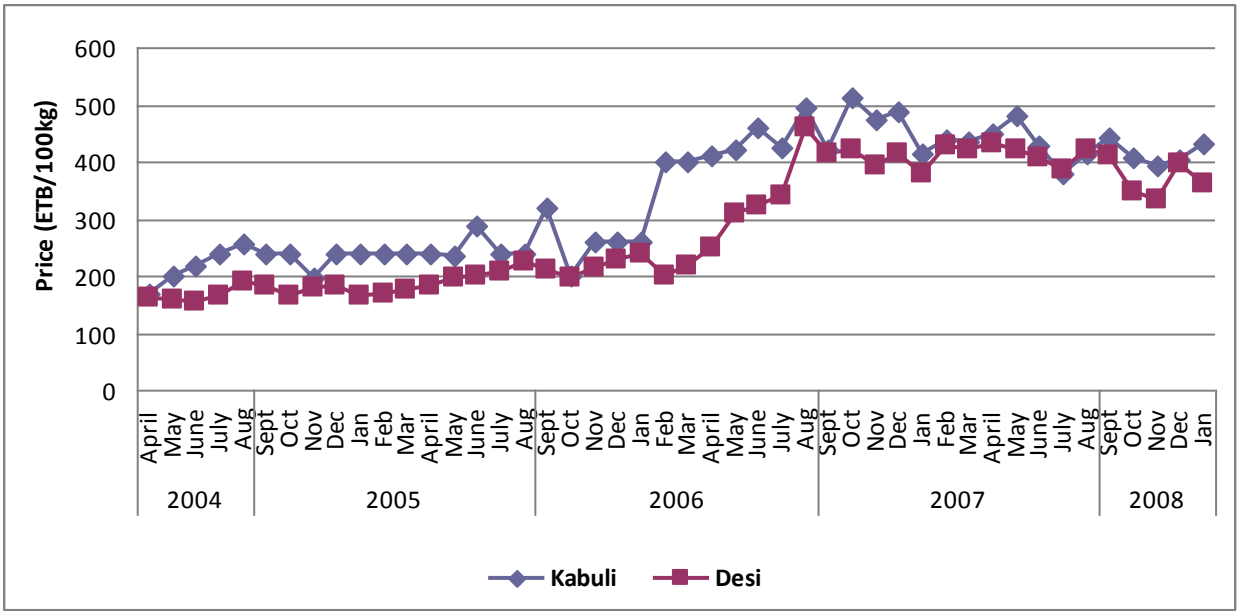


Figure 20: Monthly average Kabuli and Desi retail price trends in Deber Zeit (April 2004-Jan 2008)



6. Outlooks for Ethiopian chickpea

A number of factors including improved technology availability, relative profitability compared to other competing crops, domestic and international policy environment and adequate rainfall will influence the production and future outlooks for chickpea. The ability to respond to international markets will depend on the elasticity of supply and domestic demand changes. Analysis of the future situation of chickpea production in Ethiopia will therefore need to consider estimated historical area, yield and price trends and the policy interest to expand agricultural commercialization – especially exportable commodities in the country. The effect of higher fertilizer prices is especially expected to enhance the competitiveness of Ethiopian chickpea, which is traditionally grown in rotation with cereals. Ethiopia also has some 10 million hectares of underutilized vertisols (suffering from seasonal water-logging), which are largely suitable for chickpea production.

Two alternative methods are used to project future chickpea outlook for Ethiopia; a regression method based on historical area and yield growth patterns and simulation modeling using the IMPACT model. In this section we present the projected future outlooks for chickpea using these two methods.

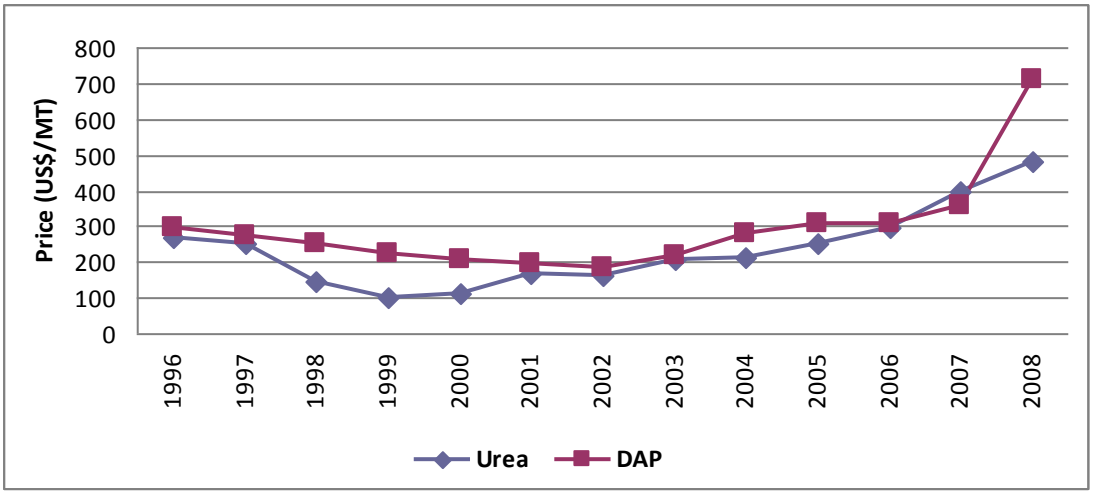
In the first approach a classic regression model is used for projection under two scenarios. In the fist scenario it is assumed farmers will continue producing chickpea using their existing method of production (business as usual). The second scenario assumes technological change as a result of adoption of large seeded and high-yielding *kabuli* chickpea varieties.

Assuming there is no technological and price change (business as usual scenario), chickpea production and area is forecasted to increase by 8% and 21% by year 2020 (Table 2). The soaring fertilizer price may push farmers particularly resource poor farmers to switch from cereal production to those crops that do not demand fertilizer such as chickpea. The DAP price increased by 99% from 2007 to 2008, almost doubled within one year time (see Fig. 21).

Table 2: Chickpea area and production forecast under different scenarios using regression methods

	Scenario 1		Scenario 2		
Year	Area ('000 ha)	Production ('000 tonnes)	Area under new varieties (%)	Production ('000 tonnes)	Change in production (%) compared to 2008
2008	208.657	277.7	<5%	277.7	
2010	217.512	321.5	10	350.2	26
2015	241.331	463.7	30	527.3	90
2020	267.757	668.8	50	709.3	155

Figure 21: Average CIF fertilizer (DAP and Urea) prices (1996-2008)



In the coming years, it is expected that area, production and productivity of *kabuli* chickpeas will increase due to new interventions and chickpea research and development projects in high potential areas of Ethiopia. It is assumed that keeping other things constant area covered by improved chickpea varieties due to adoption of new *kabuli* varieties will be 10, 30, and 50% during the period 2010, 2015, and 2020 respectively. The most important *kabuli* varieties expected to be promoted due to new intervention are Ejere (Flip-97-263C), Teji (Flip 97-266C) and Habru. The average on-station yield of these varieties is 28 quintal per hectare. Based on these assumptions, chickpea production in 2020 is estimated at 0.71 million ton up from 0.28 million ton in 2008, an increase of 155% (Table 2).

The second projection approach involves the use of IMPACT model as described in the methods section. The IMPACT model projection assumes continued adoption of new

existing varieties that improve yields over time using the current rates of productivity growth. In this sense, the IMPACT model scenario is similar to the second scenario presented using the regression methods above. In terms of the projected area and production trends over the 20–year horizon for which the projections are made, the IMPACT model results suggests that chickpea area and production in Ethiopia will show significant growth in the coming years. The IMPACT model results for production projections are similar to the regression methods, but the area and production responses seem to be more elastic. This is perhaps attributed to the dissimilarity in the methods employed and the base year considered for projection. Compared to 2008 levels, the IMPACT model projects indicate that chickpea area and production will increase by 48% and 146% respectively (Fig. 22). The implication is that if the available new varieties of chickpea reach farmers, chickpea is likely to see significant growth in production which is likely to generate significant marketable surplus that can be exported. Analysis of the long-term trends for chickpea also shows an increasing trend for harvested yield. Chickpea yield in 2020 is projected to be 1.97 tonnes per ha up from 1.19 tonnes per ha in 2008, an increase of 66%.

Figure 22: Chickpea area and production projection for Ethiopia

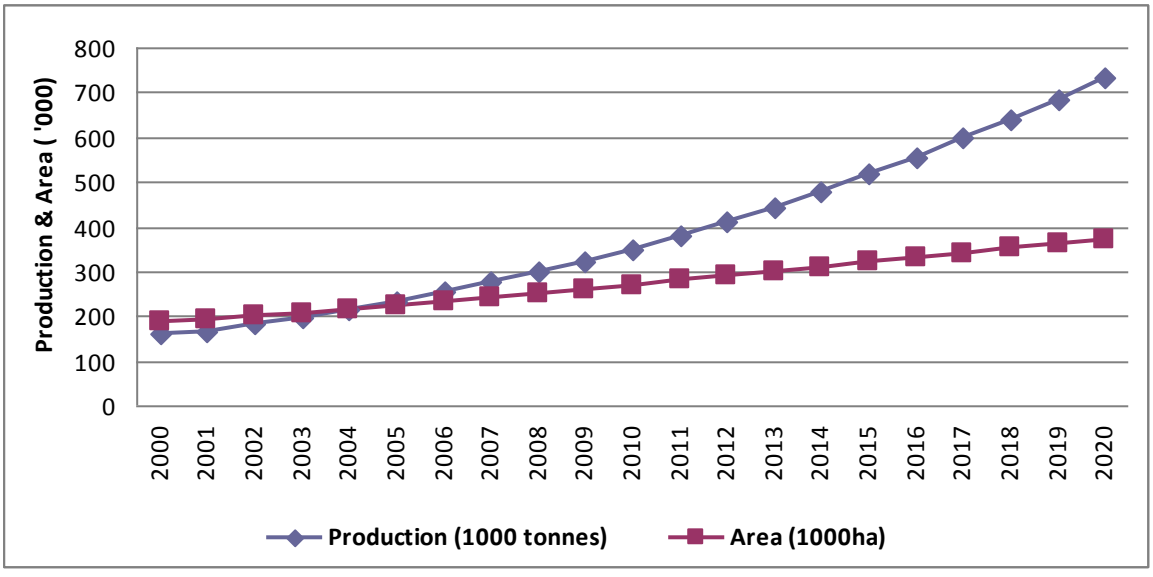
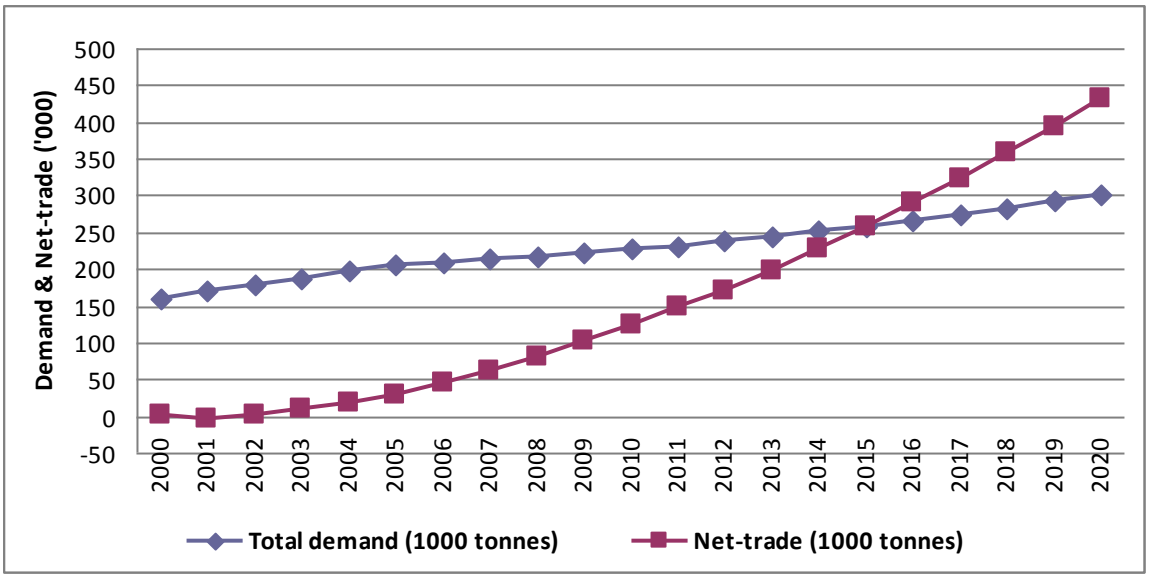


Figure 23: Chickpea demand and net-trade projection for Ethiopia



The total domestic demand projection for chickpea shows a modest growth whereas the net-trade (export minus import) does seem to grow considerably in the years to come (Fig. 23). Chickpea total demand in 2020 is estimated at 0.30 million ton up from 0.22 million ton in 2008, an increase of 39% while the net-trade projection for 2020 is expected to be 0.43 million ton up from 0.08 million ton in 2008. The expected increase in net-trade is a response to the high and growing demand for chickpea in South Asia and particularly in India as food which in turn is likely to open a larger export access for Ethiopia in particular and Eastern and Southern Africa at large where chickpea is emerging as a vital high value crop (Shiferaw *et al.*, 2008). Whether this substantial increase in exports would be achieved to exploit market opportunities in South Asia will depend on productivity growth and the extent to which area can be expanded to meet the growing market demand. Productivity growth would require expanding efforts for wider diffusion of available new varieties, which in turn would call for increased production and diffusion of seed and support for farmers to access marketing and agribusiness services to sell their surplus without significant fall in producer prices.

7. Conclusions

Poverty alleviation is at the forefront of the agenda of policy makers, researchers and development agencies. In a country like Ethiopia where the economy is dominated by the agricultural sector, the key pathway out of the poverty trap is to increase the productivity of this sector. Developing and adapting pro-poor and environmentally-friendly technologies like chickpea varieties has the potential to increase agricultural productivity and help propel subsistence agriculture towards market-oriented and income-generating pathway that will move the people out of the poverty trap. In Ethiopia chickpea is an important food and cash crop with high acceptability and wider use. It accounts for about 16% of the total pulse production of the country. In addition to being a key source of protein, chickpea fixes atmospheric nitrogen in soils and thus improves soil fertility and saves fertilizer costs in subsequent crops – a key advantage in times of high fertilizer prices in the land-locked country. Despite these and other benefits, the adoption of improved chickpea varieties is constrained by poor and inadequate seed systems, shortage of quality seed and lack of timely delivery, and insufficient access to production credit to farmers. These constraints seriously affect resource poor farmers those who do not have alternative means to access improved technologies but forced to overuse or misuse the natural resource bases to meet basic needs.

The key objective of this study is to provide a broad overview of the current situation and future outlooks for the chickpea sub-sector in Ethiopia, highlighting the existing opportunities in terms of available technologies, production conditions, seed systems, markets and key constraints and intervention areas along the value chain. The study aims to provide a quick reference to researchers and policy makers on the intervention areas that may offer higher pays for improving the productivity and competitiveness of the chickpea sub-sector in Ethiopia. In order to leverage the chickpea sub-sector for poverty reduction and food and nutritional security in the country, there is a need to *desi*gn a more flexible and sustainable seed systems that meet the needs of the resource poor farmers. This requires policy makers to open up the seed sector and encourage and assist private seed companies and community seed producer associations by improving access

to agri-business development services and empowering cooperatives and village agro-dealers.

In the short to medium term for the success of on-going chickpea projects (e.g. Tropical II and Treasure legumes projects) strengthening the revolving seed scheme may be an important strategy to increase seed access to resource-poor farmers for a number of reasons. First, the current soaring seed and fertilizer prices will significantly reduce the purchasing power of many smallholder producers. Second, the existing parastatal seed system focuses more on the production and marketing of staple cereals. Third, the seed rate for chickpea (100 kg per ha) is high compared to cereals which may not be affordable by resource-poor farmers to buy from the formal seed system. Fourth, it can be easily available to farmers on time unlike the formal seed system currently characterized by late delivery and market failures. Fifth, this system enables us to reach easily the hard to reach areas. One of the key challenges for the revolving seed scheme is the administrative costs involved to ensure timely repayment or delivery of quality seed of the same variety. The participation of the local administration and government agencies and farmer groups seems to address this problem as peer-pressure and local monitoring of participants is critical to ensure compliance and timely distribution of the seed to other farmers.

This scheme can be made operational through Community Seed Producer Associations (CSPA) both in Gimbichu and Lume districts targets areas whereas in Minjar and Shenkora it may be implemented with the support of the wereda Bureau of Agriculture and Rural Development. The revolving seed scheme can be implemented along with the existing input delivery schemes channeled through the farmer cooperatives which can play a key role in production, distribution and marketing of chickpea seed to their members. The farmer cooperatives have the advantage of accessing input credit from the banks through the loan guarantees provided by the government.

Another important intervention area is improving the performance of chickpea value chains by increasing farmer linkages with the industry and exporters, reducing transaction costs and targeting the development and distribution of large-seeded *kabuli* varieties that offer price premiums in international markets. In the absence of reliable market

information, the chickpea market remains highly volatile and unpredictable, exposing producers and value chain actors to excessive risk. Farmer cooperatives and unions may be empowered through linkages with regional and international market actors.

Ultimately, the competitiveness of smallholder farmers in chickpea production will depend on accessing, adopting and adapting promising varieties and production practices. This will require large-scale demonstration efforts and participatory variety selection in key production environments to identify locally adapted and profitable varieties. Based on lessons from fewer targeted environments, the projects may progressively adopt strategies to promote diffusion and spillovers to wider target areas.

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Appendix

Annex 1: Chickpea varieties released in Ethiopia.

Variety	Year of release	ICRISAT/ ICARDA code	On-farm yield potential (t/ha)	Type	Market traits			Agronomic traits (duration and pest, disease resistance)
					Color	100 seed weight (g)	Size in mm	
DZ-10-04	1974	-	1.4	*Kabuli*	Cream white	10.2	2-3	Medium duration
DZ-10-11	1974	-	1.9	*Desi*	Light brown	13.0	3-4	Medium duration
Dubie	1978	-	1.7	*Desi*	Grey	22.0	5-6	Early maturing
Marye	1986	K850*F378	2.3	*Desi*	Brown	25.5	5-6	Early maturing, fusarium resistant
Worku (DZ-10-16-2)	1994	ICCL 82104	2.9	*Desi*	Golden	33.0	7-8	Medium duration, fusarium resistant
Akaki (DZ-10-9-2)	1995	ICCL82106	2.6	*Desi*	Brown	21.0	7-8	Short duration, fusarium resistant
Shasho	1999	ICCV 93512	2.0 – 3.2	*Kabuli*	Cream white	29.9	6-7	Short duration, fusarium resistant
Arerti	1999	-	1.8 – 3.7	*Kabuli*	Cream white	25.7	6	Short duration, fusarium resistant
Chefe	2002	ICCV 92318	1.8 – 3.6	*Kabuli*	Cream white	27.7 - 39	6	Short duration, fusarium resistant
Teji	2005	FLIP97-266C	-	*Kabuli*	Cream white	38.1	8-9	Short duration, fusarium resistant
Ejere	2005	FLIP97-263C	-	*Kabuli*	Cream white	37.4	8-9	Short duration, fusarium resistant

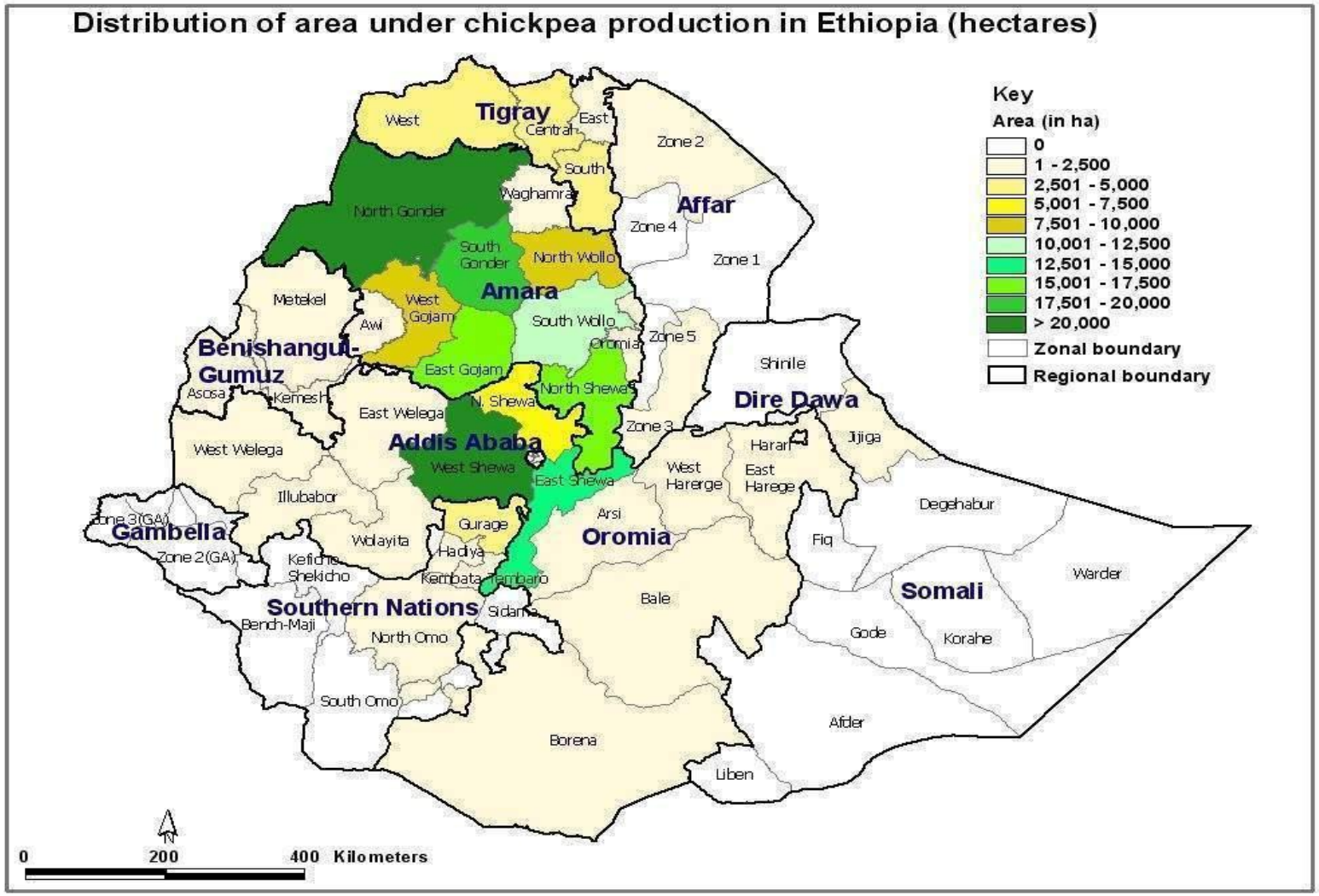
Source: ESE (2001); Bejiga *et al*. (1996); Dadi *et al*. (2005). On-farm results not available for new varieties.

Annex 2a: Distribution of chickpea production in Ethiopia.

Region/Zone/Special Wereda	Area (Ha)	Region/Zone/Special Wereda	Area (Ha)
AMHARA		**SNNPR**	
North Gonder	27,521	Gurage	2,569
South Gonder	19,885	Wolaita	735
North Wello	8,998	Gamo-Gofa	581
South Wello	11,277	Hadiya	550
North Shewa	16,049	Silte	520
East Gojjam	16,029	Burji SW	265
West Gojjam	7,541	Derashe SW	234
Waghemra	1,030	Dawro	90
Awi	490	Kembata/Tembaro	44
Oromia	613	Sub-total	5,588
Sub-total	109,432	**ADDIS ABABA**	
OROMIA		**Sub-total**	**2,668**
West Shewa	27,062	**BENSHANGUL-GUMUZ**	
East Shewa	13,670	Metekel	208
North Shewa	6,415	Asosa	154
Jimma	1,609	Kemashi	14
West Wellega	1,368	Sub-total	376
Bale	1,177	**SOMALI**	
Illubabor	1,151	Jijiga	410
West Hararge	1,028	Sub-total	410
Arsi	950	**AFAR**	
Borena	662	Zone 2	83
East Wellega	410	Zone 3	143
East Hararge	145	Sub-total	225
Sub-total	55,645	**HARARI**	
TIGRAY		Sub-total	153
West Tigray	3,417		
Central Tigray	3,292		
East Tigray	1,512		
Sub-total	8,221	**GRAND TOTAL**	**182,718**

*SW = special *wereda*

Annex 2b: Chickpea production in Ethiopia by zone.



Annex 3: Chickpea export (metric tonnes) to various parts of the world

Country	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
	Southeast Asia												
Pakistan	0	0	0	0	2,621	40,297	105	1,590	953	9,210	8,388	10,618	73,783
India	0	0	0	0	21,587	5,213	0	815	2,614	2,318	1,164	618	34,329
Bangladesh	0	0	0	0	2,400	2,450	0	108	0	0	14,847	1,218	21,022
Singapore	0	0	0	0	758	600	0	0	440	1,484	1,895	0	5,176
Iran	0	0	0	0	0	0	0	0	0	110	335	66	511
Indonesia	0	0	0	0	200	299	0	220	0	0	0	110	829
China	0	0	0	0	0	0	0	0	0	0	230	0	230
Sub-total	0	0	0	0	27,565	48,859	105	2,732	4,007	13,122	26,859	12,630	135,879
	Middle East												
UAE	0	0	0	0	3,114	3,554	416	396	456	5,675	9,513	18,946	42,070
Saudi Arabia	0	0	0	0	758	551	102	0	0	395	484	1,385	3,676
Israel	32	39	15	89	176	292	66	93	118	91	466	1,338	2,815
Yemen	0	20	10	0	579	23	1,066	50	82	41	174	164	2,208
Turkey	0	0	0	0	0	0	60	0	0	430	215	51	756
Lebanon	0	0	0	0	0	0	0	0	2	0	220	110	332
Jordand	0	0	0	0	0	0	0	0	0	22	901	527	1,450
Bahrain	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	32	59	25	89	4,627	4,420	1,710	539	658	6,654	11,973	22,521	53,307
	Africa												
Sudan	0	0	0	0	0	0	0	250	777	44	2,959	3,850	7,880
Djibouti	1	1	0	13	75	189	538	430	688	543	166	403	3,047
Senegal	0	0	0	0	0	0	0	0	0	570	0	0	570
Egypt	0	0	0	0	0	110	0	0	0	110	133	0	353
Somalia	0	0	0	0	0	0	0	0	0	352	0	0	352
Algeria	0	0	0	0	400	0	0	0	0	84	220	0	704
Morocco	0	0	0	0	0	198	0	0	0	0	0	0	198
Mauritius	0	0	0	0	0	0	0	0	0	0	67	44	111
South Africa	0	0	0	0	0	0	0	0	0	0	48	0	48
Sub-total	1	1	0	13	475	497	538	680	1,465	1,703	3,593	4,296	13,263

Country	The Americas												
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Panama	0	0	0	0	0	2,694	0	0	0	0	0	0	2,694
Canada	0	0	0	0	1,024	210	0	0	0	540	266	0	2,041
USA	0	0	0	0	205	4	5	7	29	16	345	201	811
Cuba	0	0	0	0	0	0	0	0	46	0	0	0	46
Sub-total	0	0	0	0	1,228	2,908	5	7	75	556	611	201	5,591
	Europe												
Switzerland	0	0	0	0	998	0	0	0	0	0	0	0	998
Bulgaria	0	0	0	0	0	0	0	0	0	0	855	0	855
Netherlands	0	0	0	0	0	0	0	45	382	0	0	230	657
Belgium	0	0	0	0	0	0	0	0	0	0	0	115	115
Ukraine	0	0	0	0	0	0	0	0	0	88	0	0	88
Germany	0	0	0	0	0	63	0	1	0	0	0	0	64
Iceland	0	0	0	0	18	0	0	0	0	4	0	0	22
Italy	0	0	0	0	0	0	0	2	0	0	0	0	2
UK	0	0	0	0	0	1	0	0	0	0	0	0	1
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0	1,016	64	0	48	382	93	855	345	2,803
Grand total	33	60	25	102	34,911	56,748	2,359	4,009	6,587	22,127	43,891	39,993	210,846

Source: Customs Authority of Ethiopia.