ASSESSMENT OF VEGETABLE PRODUCTION, OPPORTUNITIES AND CONSTRAINTS IN ETHIOPIA: A REVIEW

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ABSTRACT

The objective of the study was to review the trends of vegetable production, its importance, opportunities and constraints of vegetable farming in Ethiopia. The review was based on intensive reading of both published and unpublished documents. The data were analyzed using descriptive statistics using SPSS version 22. Finally, the data were presented in tabular, graphical and narration form. According to review documents, the minimum and maximum production were recorded in 1993 (712,686 tones) and 2012 (1,929,620 tones) respectively; on the other hand, the average production was 1,127,916.3 tones with standard deviation of 398,620.09 tones. Vegetable production has significant contribution in supporting household income and national income through export and used as source of food. Exports of vegetable products from Ethiopia have increased from 25,300 tons in 2002/03 budget year and it’s doubled in 2009/10. The percentage of vegetables consumed at home and country level is even more than that of cereals and pulses. Out of 5,947,370 productions in quintal, 78% of the vegetables produced were used for household consumption. Strong business image for Ethiopian vegetables in the European markets, suitable agro-ecological factors and ample demand for horticultural products are bright factor for the growth of vegetable farming in Ethiopia. On the other way, disease, financial problem, climate change, nature of vegetable, lack of marketing facility, poor post harvest management, low level of technology, farm household’s awareness and exposure to mass media are bottle necks for vegetable production.

Keywords: constraint, Ethiopia, opportunity, trend, vegetable production
INTRODUCTION

Even though Ethiopia's agriculture is plagued by periodic drought, soil degradation, high population density, high levels of taxation and poor infrastructure, it is the foundation of the country's economy, accounting for 46.3% gross domestic product (GDP), 83.9% of exports, and 80% of total employment. Many other economic activities depend on agriculture, including marketing, processing, and export of agricultural products. Production is tremendously of a subsistence nature, and a large part of commodity exports are provided by the small agricultural cash-crop sector. Exports are almost entirely agricultural commodities (Matous et al, 2013).

A potential exists for self-sufficiency in grains and for export development in livestock, grains, vegetables, and fruits. More than 80 percent of the Ethiopian population earns their livelihood from crop cultivation and livestock rearing activities. From among the sub-sectors of agriculture, crop production is a major contributor to GDP accounting for approximately 28% (Fitsum et al, 2009). Ethiopia’s crop agriculture involves substantial variation in crops grown across the country’s different regions and agro-ecologies. Smallholders account for 96% of total area cultivated and generate the key share of total production for the main crops (Alemayehu et al, 2011).

Principal crops grown in Ethiopia are coffee, pulses, oilseeds, cereals, potatoes, sugarcane and vegetables. Vegetable production plays a major role in the realization of Ethiopian food security and poverty alleviation strategy. It enhances agricultural production and improves, income of rural population, opening employment opportunities for the poor, supports national economy by producing industrial crops that are used as raw materials for value adding industries, exportable crops and sustainable strategy for increasing household food security (Getu, 2011).

Vegetable production plays important role in poverty alleviation through employment generation, improving the feeding behavior of the people, and creating new opportunities for poor farmers. Since the labor to land ratio of vegetable cultivation is high, vegetable products are bulky and perishable, and vegetable has continuous demand in the market, its production and marketing allows high productive employment. Increasing horticultural production and marketing thus contribute to commercialization of the rural economy and create many off-farm jobs (Weignberger and Lumpkin, 2005).

Vegetable crops are produced in different agro-ecological zones through commercial as well as small farmers both as a source of income and food. However, the production of vegetables varies from cultivating a few plants in the backyards for home consumption up to a large-scale production for domestic and export markets (Dawit et al, 2004). Vegetables can generate high income for the farmers because of high market value and profitability. They also have high nutritive value compared to cereals. However, several factors attributed to the riskiness of vegetable production (EARO, 2000).
Depending on reviewed documents, this study aimed to assess the trends of vegetable production, the importance of vegetable production, opportunities and constraints of vegetable production in Ethiopia.

MATERIALS AND METHODS

The assessment was based on intensive reading of both published and unpublished documents. This study review production trends of major vegetables grown in Ethiopia from 1961-1992; and the area harvested, production and yield of the aggregate vegetables from 1993-2012. The data were analyzed using descriptive statistics (minimum, maximum, mean and standard deviation) employing SPSS version 22. Finally, the data were presented in tabular, graphical and narration form.

RESULTS AND DISCUSSION

Trends of vegetable production in Ethiopia

In the case of vegetables, while remaining modest, production growth is slightly better than for fruits with average per annum growth of 3.4% over the period since 1993. The major vegetables produced for domestic consumption are cabbages, tomatoes, onions, and garlic, while green beans and peas have recently emerged for export purposes. Over the past ten year period, production gains have largely come about with increased area rather than yield increases (World Bank, 2004).

In 2011/12 production year, 293,609 and 266,264 smallholder farmers were engaged in vegetable production, and 909,776.5 and 710,988.48 quintals of vegetables were produced in East Hararghe and West Hararghe Zones, respectively (CSA, 2012).

In Kombolcha Woreda 693,899 quintals of vegetables were produced in 2011/12 production season on 2,607.5 hectares of land (KWOoARD, 2012). In Habro Woreda, 223,080 quintals of vegetables were produced in 2011/12 production season on 1309 hectares of land (HWOoARD, 2012). The most common grown vegetables are potato, cabbage, carrot and beetroots in Kombolcha Woreda, and tomato, cabbage, beetroot and onion in Habro Woreda.

On average, 3.05 million farmers cultivate vegetables and about 0.032 hectare of land was cultivated by an average holder. Red peppers and Ethiopian cabbage occupy about 56.2 and 24.8% of the total area under vegetable crops, respectively. The same crops constitute 20.7 and 56.6% of the country’s volume of vegetable production (Ethiopian Economic Association, 2005).

About 4 million quintals of vegetables were produced in 2001/02. About 38% of all vegetable produced were consumed by the producers themselves (CSA, 2003). As the report of CSA (2008) demonstrated, 453,608.8 hectare (ha) was covered by vegetables with annual production of 18,124,613.5 quintal (Qt).

Vegetables took up about 1.18% of the area under all crops at national level. However, of the total estimated area under vegetables, the lion share which is about 67.98% and 19.86% was under red peppers and Ethiopian Cabbage, respectively. As to production of vegetables contribute 2.78% to all crops production total, the share of red peppers and Ethiopian was about 31.69% and 42.76% (CSA, 2012).
Even though the production of vegetable varies from year to year, both the minimum and maximum production were recorded in 1993 (712686 tones) and 2012 (1929620 tones) respectively; on the other hand, the average production was 1127916.3 tones with standard deviation of 398620.09 tones. On the other hand, the maximum and minimum area harvested in hectare was 226650 (1994) and 431848 (2009) with mean and standard deviation of 296444.25 and 67241.72 ha, respectively. Similarly the amount of yield in hg/ha were also reviewed from 1993-2012. So, the minimum and maximum amount of yield were obtained in 1993 (31, 284.2 hg/ha) and 2012 (45, 925.1 hg/ha) with mean and standard deviation of 37185.84 and 5235.47 hg/ha, respectively.

**Table 1. Vegetable production, yield and area harvest trend from 1993-2012**

<table>
<thead>
<tr>
<th>Year</th>
<th>Area Harvest (ha)</th>
<th>Yield (hg/ha)</th>
<th>Production (tones)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>227810</td>
<td>31284.2</td>
<td>712686</td>
</tr>
<tr>
<td>1994</td>
<td>226650</td>
<td>32305.9</td>
<td>732213</td>
</tr>
<tr>
<td>1995</td>
<td>227585</td>
<td>33013</td>
<td>751326</td>
</tr>
<tr>
<td>1996</td>
<td>236749</td>
<td>32354.1</td>
<td>765980</td>
</tr>
<tr>
<td>1997</td>
<td>250063</td>
<td>32837.8</td>
<td>821153</td>
</tr>
<tr>
<td>1998</td>
<td>243088</td>
<td>33202.6</td>
<td>807116</td>
</tr>
<tr>
<td>1999</td>
<td>254779</td>
<td>33085.9</td>
<td>842960</td>
</tr>
<tr>
<td>2000</td>
<td>246638</td>
<td>34334.4</td>
<td>846818</td>
</tr>
<tr>
<td>2001</td>
<td>272605</td>
<td>31899.7</td>
<td>869602</td>
</tr>
<tr>
<td>2002</td>
<td>292094</td>
<td>33145.6</td>
<td>968162</td>
</tr>
<tr>
<td>2003</td>
<td>258983</td>
<td>38992.8</td>
<td>1009850</td>
</tr>
<tr>
<td>2004</td>
<td>289937</td>
<td>41759.8</td>
<td>1210770</td>
</tr>
<tr>
<td>2005</td>
<td>293958</td>
<td>45405.8</td>
<td>1334740</td>
</tr>
<tr>
<td>2006</td>
<td>329861</td>
<td>36802</td>
<td>1213950</td>
</tr>
<tr>
<td>2007</td>
<td>291489</td>
<td>37427.3</td>
<td>1090970</td>
</tr>
<tr>
<td>2008</td>
<td>344545</td>
<td>40365</td>
<td>1390760</td>
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<tr>
<td>2009</td>
<td>431848</td>
<td>38664</td>
<td>1669700</td>
</tr>
<tr>
<td>2010</td>
<td>392523</td>
<td>45925.1</td>
<td>1802670</td>
</tr>
<tr>
<td>2011</td>
<td>393335</td>
<td>45437.3</td>
<td>1787210</td>
</tr>
<tr>
<td>2012</td>
<td>424345</td>
<td>45474.4</td>
<td>1929690</td>
</tr>
<tr>
<td>Total</td>
<td>5928885</td>
<td>743716.7</td>
<td>22558326</td>
</tr>
<tr>
<td>Minimum</td>
<td>226650</td>
<td>31284.2</td>
<td>712686</td>
</tr>
<tr>
<td>Maximum</td>
<td>431848</td>
<td>45925.1</td>
<td>1929690</td>
</tr>
<tr>
<td>Mean</td>
<td>296444.25</td>
<td>37185.84</td>
<td>1127916.3</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>67241.72</td>
<td>5235.47</td>
<td>398620.09</td>
</tr>
</tbody>
</table>

Source: FAOSTAT, 2015
ROLE OF VEGETABLE PRODUCTION

SOURCE OF INCOME

The major vegetable export products include potatoes, green beans, okra, melon, white and red onions, shallots, cabbage, leeks, beetroot, carrots, green chillies, tomatoes and lettuce. Cut flower and vegetable production are fast growing export businesses, and Ethiopia is a centre of diversity for a variety of flowering plants. The volume of export of these products is growing and showing great promise (Agriculture, 2010).

Vegetables are not only important for domestic consumption as a source of key nutrients, but they also generate some foreign exchange earnings. For instance, in 2001/02, Ethiopia exported about 61 thousand tons of vegetables that fetched 11.5 million Birr in foreign currency (CSA, 2003).

The total quantity of vegetable exports reached a record high in 2002 of 14,666 tons, largely due to a significant increase in the exports of green broad beans. In terms of the product composition of exports in 2001, onions were one quarter of total export quantities followed by tomatoes (19%), green peas (18%), and green beans (15%). In value terms, green beans contributed 23%, followed by green peas (21%), onions (20%) and tomatoes (19%) (World Bank, 2004).

In 2003/04, the country has earned 5.17 billion Birr in foreign currency from its export trade. Agricultural export accounted for 82.2% of this income, while 37.3 and 2.7% of the income generated from the export of coffee and semi-processed agricultural commodities, respectively. Most of the export products are raw products, while few are semi-processed agricultural products. The major unprocessed agricultural export commodities include coffee, oilseeds, pulses, fruits and vegetables, chat and live animals; while leather
and leather products, meat, and sugar constitute the major semi-processed export commodities (Ethiopian Economic Association, 2005). Exports of vegetable products from Ethiopia have increased from 25,300 tons in 2002/03 budget year and it's doubled in 2009/10 (EHDA, 2011).

<table>
<thead>
<tr>
<th>Year</th>
<th>Export Value (1000$)</th>
<th>Volume (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>467</td>
<td>6, 370</td>
</tr>
<tr>
<td>1994</td>
<td>1,421</td>
<td>9,821</td>
</tr>
<tr>
<td>1995</td>
<td>518</td>
<td>7,921</td>
</tr>
<tr>
<td>1996</td>
<td>339</td>
<td>5397</td>
</tr>
<tr>
<td>1997</td>
<td>227</td>
<td>4,081</td>
</tr>
<tr>
<td>1998</td>
<td>693</td>
<td>2,650</td>
</tr>
<tr>
<td>1999</td>
<td>2,543</td>
<td>7,941</td>
</tr>
<tr>
<td>2000</td>
<td>2,405</td>
<td>8,020</td>
</tr>
<tr>
<td>2001</td>
<td>1,239</td>
<td>4,352</td>
</tr>
<tr>
<td>2002</td>
<td>-</td>
<td>14,666</td>
</tr>
</tbody>
</table>

Source: FAOSTAT, 2005

SOURCE OF FOOD

Vegetables are the fresh and edible portions of herbaceous plants. They are important food and highly beneficial for the maintenance of health and prevention of diseases. They contain valuable food ingredients which can be successfully utilized to build up and repair the body. Vegetables are valuable in maintaining alkaline reserve of the body. They are valued mainly for their high carbohydrate, vitamin and mineral contents (Rumeza et al, 2006).

Fruits and vegetables play a number of important roles in human health. They provide antioxidants such as vitamin A, C and E that are important in neutralizing free radicals (oxidants) known to cause cancer, cataracts, heart disease, hypertension, stroke and diabetes. Similarly, vegetables are good sources of minerals such as iron, zinc, calcium, potassium, and phosphorus and contain ample fiber, important for digestion and bowel movements (Quebedeaux, 1988; Prior and Cao, 2000; Wargovich, 2000).

Vegetable crops are rich in vitamins, carbohydrates and other nutrients that contribute to a major portion to an Ethiopian daily dish mix. Some nutritional deficiencies like vitamin A and C, and iron can be corrected by use of selected vegetable and root crops as well as fruits. In some areas of the country, root crops particularly potatoes and sweet potatoes are used as staple food for considerable portion of the population. Root crops in general are drought resistant and serve as food crops in drought prone areas (Getu, 2011).
The percentage of vegetables consumed at home at country level is even more than that of cereals and pulses. According to the report of CSA (2015), out of 5,947,370 productions in quintal, 78% of the vegetables produced were used for household consumption.

**OPPORTUNITIES OF VEGETABLE PRODUCTION**

The opportunities for increasing horticulture production include the increase in market integration, the need for intensive production in response to increasing population pressure, farmers' awareness of the benefits, the current outreach program in relation to supportive government policy and attempts made in water harvesting (Bezabih and Hadera, 2007). The same source also identified increase in price of the product, relatively high demand in the market, possibility of using improved inputs and rent land, having a pumping machine, increased production skills, availability of nearby water, land suitability and labor availability are opportunities for vegetable production in Ethiopia.

As the report of World Bank (2004) indicated, Ethiopian vegetable production has the following opportunities:

**Strong business image for Ethiopian vegetables in the European markets:** Ethiopia is very well known in some parts of Europe especially for her green beans, climbing beans, cut flowers, okra, melon and passion fruit. There is demand for these Ethiopians products during a particular period and a great volume is re-exported.

**Suitable agro-ecological factors:** this opportunity gives all year round production capability. Generally, this is an advantage over many other competing countries. The untapped natural resources promise a very successful horticulture business more than anything else, as far as agriculture is concerned. According to Agriculture (2010) document revealed with a favorable climate, most regions of the country are suitable for the production of a wide range of tropical and sub-tropical fruits, vegetables and flowers.

**Ample demand for horticultural products:** there exist many niche markets for a wide variety of products, most of which could be produced by one or the other farms. In most cases the problem is not the market but it remains to be the question of competitiveness and/ or economies of scale.

**Constraints of Vegetable Production**

Even though vegetable production serves as means of income and food source, several factors attributed to the riskiness of vegetable production. Kumilachew et al (2014) identified and rank major constraints of vegetable production in Oromiya region of Ethiopia. These are: drought, pest/disease, termite/insect attack, flood, price fluctuation, high cost of input, and high cost of credit, institutional change in policy and rules, and theft.
Riskiness of vegetable production may be attributed to several factors that are beyond the control of producers. Biological processes of plant growth and climatic conditions inherent in agricultural production cause random production shocks (Holt and Chavas, 2002) such as harvest failure as a result of drought, frost, floods and other adverse climatic events and policy shocks (Dercon, 2002).

Due to perishable nature and biological nature of production process, there is a difficulty of scheduling the supply of vegetables to market demand. The crops are subjected to high price and quantity risks with changing consumer demands and production conditions. Unusual production or harvesting weather or a major crop disease can influence badly the marketing system. While food-marketing system demands stable price and supply, a number of marketing arrangements like contract farming provide stability (Kohl and Uhl, 1985).

The report of World Bank (2004) identified and categorized the following major constraints of vegetable production in addition to poor quality of the packing material, inadequate testing of agro-chemicals, commercial and organic fertilizers for horticulture crops and increasing cargo freight cost for horticulture export products. These are:

- **Lack of financial and technical assistance to private investors**: the situation most of the private investors have faced is different from what is predicted during the pre-feasibility stage. Consequently, the projects are left with a financial position for which adjustment of loan repayment schedule and additional capital injections are not only required but also seem to be indispensable.

- **Inadequate cooling chain and cargo handling**: post harvest handling practices as maintaining the desired temperature of the product have a direct relationship with its value. Reportedly, competing countries, in addition to their proximity to the market, enjoy the advantage of many and frequent passenger flights.

- **Increase in the level of production of competing countries** due to a strong support to the private sector gained from governmental and non-governmental organization.

- **Inadequate variety selections and development program** for improved hybrid cultivators of horticultural crops.

The study conducted by Bezabih and Hadera (2007) indicated that the constraints of vegetable production vary with the type of vegetable. For instance, most farmers indicate that shortage of fertilizer, diseases, and frost are the most priority problems of producing potato. On the other hand, fertilizer, pests and diseases and shortage of pesticides are top constraints of production of beetroots and carrots. Water shortage or drought, lack of fuel for pumping irrigation water, frost and fertilizer shortage on the other hand are the most important problems for onion production.

On the other hand, Samantaray et al, 2009, classified the constraints into four groups namely social, organizational, technology transfer and economy.
1. Social Constraints: The social problems are location specific and mostly concerned with individuals residing in a specific social such as lack of awareness, low adoption by neighbors, traditional norms and adverse socio-political system in the villages are the most important constraints of vegetable farming.

2. Organizational Constraints: the result of the study identified the following organizational constraints of vegetable production. These are: poor co-ordination and co-operation among grass root level extension workers, low credibility of extension workers, lack of timely advice and guidance by extension personnel, non availability of production inputs timely, irregular visit of extension worker and lack of effective supervision.

3. Constraints in technology transfer include lack of land consolidation, absence of proper post harvest technology, inadequate training program; lack of approach to demonstration, low level of technical know-how, non-exposure to mass media and lack of soil testing facilities are major constraints.

4. Economic constraints were identified which stand as barrier in increasing production and productivity of vegetables which includes absence of storage facility, poor economic status, low risk bearing capacity and high cost of technology, poor marketing facilities, poor transportation and non-availability of credit.

CONCLUSION

Vegetable crops are produced in different agro-ecological zones through commercial as well as small farmers both as a source of income and food. Vegetables took up about 1.18% of the area under all crops at national level. On average, 3.05 million farmers cultivate vegetables and about 0.032 hectare of land was cultivated by an average holder.

Even though the production of vegetable varies from year to year, both the minimum and maximum production were recorded in 1993 (712686 tones) and 2012 (1929620 tones) respectively; on the other hand, the average production was 1127916.3 tones with standard deviation of 398620.09 tones. On the other hand, the maximum and minimum area harvested in hectare was 226650 (1994) and 431848 (2009) with mean and standard deviation of 296444.25 and 67241.72 ha, respectively. Similarly the amount of yield in hg/ha were also reviewed from 1993-2012. So, the minimum and maximum amount of yield were obtained in 1993 (31, 284.2 hg/ha) and 2012 (45, 925.1 hg/ha) with mean and standard deviation of 37,185.84 and 5235.47 hg/ha, respectively.

Vegetable production has significant contribution in supporting household income and national income through export and used as source of food. Vegetables are good sources of minerals, rich in vitamins, carbohydrates and other nutrients. They are important food and highly beneficial for the maintenance of health and prevention of diseases (cancer, cataracts, heart disease, hypertension, stroke and diabetes).
The need for intensive production, land suitability and labor availability, large water potential for irrigation, strong business image for Ethiopian vegetables in the European markets, suitable agro-ecological factors and ample demand for horticultural products are bright factors for the growth of vegetable farming in Ethiopia. Even though Ethiopia has huge potential for vegetable farming, some factors undermine vegetable production in Ethiopia. These are:

- Disease
- Insect attack
- Financial problem
- Climate change
- Access to input
- Nature of vegetable (perishable)
- Lack of marketing facility
- Poor post harvest management
- Competitiveness
- Farm household’s awareness
- Interest of extension workers
- Low level of technology and
- Exposure to mass media etc.

REFERENCES


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