

**Case Report**

Assessment of Horticultural Crops (Vegetables, Tubers & Fruits) Production Constraints and Opportunities in West and Southwest Shewa Zones of Oromia Region, Ethiopia

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Abstract: Horticulture is the branch of agricultural science that uses technology and marketing strategies to increase vegetables, fruits, flowers and ornamental plants production for human welfare. In Ethiopia, more than 85% of the population depends on agriculture. However, agricultural production is less due to lack of advanced agricultural technologies and yield losses caused by damaging pests, diseases and environmental conditions. Many farmers in west and southwest Shewa zones also depend on agricultural production especially cash crops like fruits and vegetables. The study was conducted in the seven districts producing major horticultural crops and the data collection was done in May 2013. The study districts did not have enough information on horticultural crop cultivation constraints and opportunities. Data on horticultural crops constraints and opportunities were collected based on prepared questionnaires with group discussion of farmers and other responsible bodies. The two zones are suitable for growing of various horticultural crops. Farmers are faced a lot of problems such as abiotic (lack of pure planting materials, long chain marketing systems and adverse environmental factors) and biotic factors (fungus, bacterial and insects) on the horticultural crop production.

Keywords: Constraints, Horticultural Crops, Opportunities

1. Introduction

Horticulture is a section of agricultural sciences that employs scientific understanding to produce vegetables, fruits and flowers and enrich human diet. It is utilized by both, individuals and industries to enhance the nutritional and economic standards. This study area is diverse in its ventures involving food crops, ornamental plants, medicinal plants and grasses. This series of vegetation may support to fulfil basic requirements of human health and well-being. Horticultural crops are the primary source of poverty reduction in most agriculture-based economies. The expansion of smallholder farming can lead to a faster rate of poverty alleviation, by raising the incomes of rural cultivators and reducing food expenditure, and thus reduces income inequality [1-7].

Horticultural crops play a significant role in developing country like Ethiopia, both in income and social spheres for

improving income and nutrition status. In addition, it helps in maintaining ecological balance since horticultural crops species are so diverse. Further, it provides employment opportunities as their management being labour intensive, production of these commodities should be encouraged in labour abundant and capital scarce countries like Ethiopia.

African smallholder farmers can be categorized on the basis of: (i) the agro-ecological zones in which they operate; (ii) the type and composition of their farm portfolio and landholding; or (iii) on the basis of annual revenue they generate from farming activities. In areas with high population densities, smallholder farmers usually cultivate less than one hectare of land, which may increase up to 10 ha or more in sparsely populated semi-arid areas, sometimes in combination with livestock of up to 10 animals [8].

In Ethiopia, horticultural crops including fruits, vegetables and root crops contribute one-fourth of the crop production [9]. However, it still needs improvement employing innovative

technologies to combat with the biotic and abiotic threats. As a result average productivity levels are low in the small scale farming sector [10]. Many farmers in west and southwest Shewa zones also depend on horticultural production especially cash crops like fruits and vegetables. The study was conducted in the major horticulture producing seven districts. Those districts had not enough information on horticultural crop cultivation constraints and opportunities. To carry out this research, there were these objectives

(1) to identify the major problems on the fruits and vegetables production in the assessed areas, (2) to know the opportunities for fruits and vegetables products in the study area, (3) to get initial information in order to start horticultural activities.

2. Materials and Methods

2.1. Description of the Study Area

The assessment was conducted in west and southwest Shewa zones, Oromia regional state in May 2013. West Shewa zone is located at 8°57'N latitude and 38°07'E longitude and within elevation ranges between 1380-3300 m.a.s.l. Annual mean maximum and minimum rain fall is 1900mm and 600mm, respectively. The mean minimum and maximum air temperature of the area is 11.7°C and 25.4°C, in that order. Southwest Shewa zone is located at 8°16'-9°56'N latitude and 37°05'-38°46'E longitude and altitude ranging from 1600-3576 m.a.s.l. It receives annual rainfall ranging from 900-1900 mm. The mean minimum and maximum air temperature of the area is 10°C and 35°C, respectively.

2.2. Horticultural Crops Field Survey

The assessment was covered seven districts such as Dendi, Ambo, Chelia, Tokaye Kutaye, Woliso, Wonchi and Ilugelan Districts (woredas locality). The survey was focused on the major fruits and vegetables cultivated areas. I had already prepared questionnaires form (appendix 1) and discussed with farmers as well as agricultural experts in informal ways. I started the discussions with Zones and Districts agricultural, and rural development offices and then extending to different kebeles (locations) to meet farmers and agricultural development agents. I raised the questions and discussed with group or individual farmers (Figure 2). I covered twenty eight horticultural crops potential locations (areas) and asked eighty four farmers to gather essential information. I took some horticultural crop samples in order to identify the problems at laboratory whether it is diseases or not. The trip was stayed for 8 days to gather the main information of horticultural crops.

2.3. Selection of Districts and Participating Farmers

The districts were selected based on horticultural crops area coverage that was obtained from Zones agricultural offices. Farmers were selected systematically founded on their experience of horticultural crops cultivation systems and followed systematic sampling

2.4. Data Analysis and Interpretation

Survey information was analysed by using the descriptive statistical analysis. Final writing was done based on photo graphs and answers of farmers.

3. Results and Discussion

In west (Dendi, Ambo, Tokaye kutaye, Cheliya, Ilugelan) and southwest (Woliso, Wonchi) Shewa zones of Oromia region are grown different types of horticultural crops in multi agro ecological zones. Horticultural crops (fruits & vegetables) such as Potato, tomato, onion, cabbage, beet root, sweet Potato, Carrot, Pepper (green and red), banana, garlic, orange, avocado, mango, apple, enset, lemon, Papaya and Shallot are the major ones that grow in the two zones of Oromia region (table 1). Even though the two zones are suitable to grow any types of horticultural crops, most farmers do not cultivate the above mentioned fruit and vegetable types due to abiotic and biotic factors.



Fig. 1. Family Intensive garlic production at west Shewa zone.



Fig. 2a. Group discussion with farmers.



Fig. 2b. Group discussion with farmers at west and southwest Shewa zones.

Farmers get those planting materials (seeds, seedlings) from different sources such as locally prepared, market, Holeta Agricultural Research center (potato), Agricultural and rural development offices and nongovernmental organization (world vision for apple and Mango). However, the distribution of horticultural planting materials does not address most farmers.



Fig. 3. Root rot disease symptom on matured pepper plants.

This is because, only few governmental and nongovernmental organizations are participating in the supplying of horticultural planting materials and they do not cover most farmers need due to financial and other constraints. Except garlic, potato and cabbage planting materials, most of vegetables seed sources are imported from different abroad countries with high foreign currency. Many Ethiopian poor farmers do not encourage buying these imported vegetables planting materials due to unaffordable prices.



Fig. 4. Datura plant seeds.

Most vegetables and fruits growers in the two assessed zones applied inorganic fertilizer (Dap and Urea) below the standard rates. If they applied organic fertilizer (not well decomposed), diseases and insects damage their horticultural crops especially root and leafy crops (Figure 3, 5, 7, 8, & 9). Some farmers use well decomposed organic fertilizer (Compost) and they prefer this one due to high prices of Dap and Urea. Farmers have an interest to use well decomposed organic fertilizer (compost) if they receive efficient on preparation method.



Fig. 5. Dead pepper root with Fusarium disease at Woliso district.

The suitable conditions for vegetable and fruit production in west and southwest zones of Oromia region are different agro ecological zones (high land, Mid land & low land), fertile and different soil types, sufficient water sources (rain fall, rivers, lakes, springs and ponds), proximity to market and main roads of Addis Ababa, enough irrigable and cultivable lands.



Fig. 6. Ground potato tubers storage at Dendi district in west Shewa zone.

The major problems for fruits and vegetables production in the studied areas are unavailability of improved varieties, price fluctuation during harvesting of excess horticultural crops, diseases like anthracnose, Coffee die back, early and late blight, white rot, Fusarium and bacterial wilt, insects such as trips, aphids, cut worm and termite. Farmers have not obtained enough training on how to apply and handle new technologies such as chemicals and planting materials. Some farmers faced shortage of water during dry seasons in order to grow their high value horticultural crops in furrow irrigation due to reduction of water bodies (rivers, lakes, springs and ponds) resulting from insufficient rain fall during winter time

with unpredictable climate change effects. Sometimes farmers leading to disagreements and quarrel each other for water computing. Farmers need water saving irrigation systems such as drip and sprinkler irrigation with combination of local agricultural practices like mulching. Farmers used local and unidentified seeds and seedlings as planting materials due to lack of improved and pure planting materials with reasonable prices from markets. For example, some farmers in Chelia district bought *Datura* weed seeds (Fig. 4) as onion seeds with high price due to lack knowledge in order to differentiate the seed types. Based on farmers' response, they are exposed to unaffordable prices of seeds, seedlings, fertilizers and chemicals.



Fig. 7. Symptom of *Anthracnose* disease on orange fruits at Ilugelan district.

The lack of use of high-quality seed and planting material is due to high prices (already comprising 16% of total input costs), which reflects limited supplies and lack of awareness among producers of the benefits of higher-quality inputs [11].

Some farmers are tried to solve those problems in different ways by themselves. Even though the prices of chemicals are high, some farmers bought different chemicals and sprayed on their horticultural crops in order to protect from diseases and insects. Farmers also use cultural practices like crop rotation in order to reduce the initial inoculum of disease causing microorganisms and insects in the following cropping seasons. Potatoes are stored for use as seed or for food or sale. Different methods of storage have been described by CIP [12] which including house' out-building and field. The convenience and security of storage in the house is evident. Farmers in Dendi district (Werka Gara and Galesa Kofetu locality) left potato

tubers in the soil as it is at harvesting period and stored for long time until potato prices increasing at local markets (Figure 6). Potato tubers underground storage is a unique cultural practice in this area although it is not supported by scientific researches regarding to quality and disease aspects.

According to R. C. Upadhyaya [13] report, field storage is more frequently adopted at higher elevation. Werka Gara and Galesa Kofetu in Dendi district also found at high elevation (above 2700 m.a.s.l.) and ventilation with air at ambient temperature assists the storage process. The cool moist environment diminishes dehydration but the system is exposed to flooding which may largely damages the crop production. Some farmers made association (union) and Prepared potato tubers as planting materials with cooperation of Holeta Agricultural Research center. These farmers obtained high incomes by selling potato yields directly for consumers at local markets as well as potato cultivar as planting materials for potato growers. Farmers use their own indigenous cultural methods such as ash, fermented mixture of soap, garlic, animal urine and pepper powder to control early and late blight of potato. Even though most of the study areas are near to main roads and markets, horticultural crops marketing channels are long and time consuming. Marketing channels contain producers, collectors/brokers, wholesalers, retailers and consumers.

The main beneficiaries in this marketing system is collectors/brokers and then wholesalers. Perishable horticultural crops like tomato, leafy vegetables and others are bought by wholesalers from farmers with the facilitating of brokers at low prices and sold to consumers with high prices. This problem is occurred due to low bargaining forces of farmers, lack of modern storage and transportation systems, lack of local agro-industries and high perishability of most horticultural crops. This kind of marketing system is not benefit to producers and consumers. Because farmers invest a lot of things from land preparation up to harvesting and they did not get enough profits. Similarly prices increasing on most of horticultural products and this create high pressure on consumers especially at poor households.

The Horticultural Crops Development Authority (HCDA) in Kenya reported that due to the lack of direct associations between small-scale farmers and customers, brokers buy the crops from the growers at lower rates [14]. In Africa, large quantities of agricultural commodities produced by farmers tend to rot away unmarketed, while the smallholder farmers do not have the technology for timely consumption [15].



Fig. 8. Symptoms of dieback disease on *Coffee* seeds and plants.

Farmers, Development agents, Woreda agricultural and rural development office need a lot of supports from research centres like Ambo plant protection Research Center/APPRC/, governmental agents, NGOs and other responsible bodies. They need improved planting materials that resistant to diseases and insects; trainings on preparation and selection of pure planting seeds and seedlings, application of chemicals based on its recommended rate, time of application with economic thresholds of diseases/insects and distinguishing of various disease symptoms; preparation of well decomposed organic fertilizer (compost); integrated diseases, weeds and insects management methods; use of available water resources with efficient irrigation methods.



Fig. 9. Garlic leaves infected with rust disease at Dendi and Ambo districts.

If well-utilized, stronger linkages of smallholders with supermarket chains are likely to improve marketability and profitability of their products. In this regard, East African countries can draw on experiences of other countries. For example, evidence from Madagascar suggests lessons on how smallholder farmers can benefit from the emerging retail networks. In Madagascar, one of the poorest countries in the world, small-scale farmers that produce vegetables for supermarkets in Europe receive assistance and supervision through contract mechanisms, which help them meet the complex quality standards of the European markets. As documented in Minten *et al.* [16] “the number of farmers of vegetables for exports has grown in Madagascar, despite major disadvantages of geography, bad local infrastructure, low rural education levels, and high compliance and transaction costs...” Authors conclude that given the right incentives and contracts, small farmers in Africa can benefit from the emerging supermarket chains.

Moreover, the use of local radio, mobile phones and the internet, has increased the avenues for timely and wider delivery of useful market information [17]. All these new initiatives help empower smallholder farmers to make quick and informed decisions that will enhance their productivity.

Table 1. Summarization of survey points in west and southwest Shewa zones of Oromia region.

No	District name	Major horticultural crops	Suitable conditions	Problems	Fertilizer types	Expectation from APPRC, NGOS, GOS
1	Tokaye Kutaye	Potato, tomato, onion, cabbage, beet root, carrot s.potato, Pepper, banana, garlic, orange, apple, lemon, grape	Market, climate, fertile soil, water, Irrigable land	Expensiveness of chemicals, insects, wilt, white rot, rust, cut worm, aphids, weeds, early and late blight	Mostly inorganic fertilizer	Improved planting materials, training on insecticide application and management
2	Cheliya	Potato, cabbage, onion, garlic, apple, beet root, carrot, shallot	Ecology, weather condition, Irrigation availability	Rust, cut worm, aphids, wilt, white rot, shortage of pure planting materials	Both organic and inorganic fertilizers	Improved planting materials, pesticide supplement, training and technical assistance on d/t agricultural technologies
3	Dendi	Garlic, potato, onion, Enset, apple, beet root, cabbage, carrot, tomato	Climate, fertile soil, market proximity to Addis Ababa and main road	White rot, rust, Bacterial blight, shortage of pure planting materials	Both organic and inorganic fertilizers	Improved vegetable and fruit varieties like garlic, potato, apple, Enset, etc the right pesticides, facilitating of market
4	Ambo	Onion, potato, garlic, beet root, tomato, cabbage,	Irrigation, ecology, market accessibility, proximity to main roads	Lack of improved varieties, increasing of fertilizer prices, white rot, termite, wilt, rust	Inorganic fertilizer	Supplying of improved vegetable and fruit varieties, training on pests management and pesticide uses
5	Wonchi	Potato, tomato, Cabbage, beet root, onion, garlic, apple, mango, avocado, banana, Enset	Ecology, irrigation,	Lack of pure planting materials, trips, white rot, wilt, rust	Inorganic fertilizer	Improved horticultural planting materials, Continuous assessment, pesticide training and supplement
6	Woliso	Potato, S.potato, onion, tomato, pepper, beet root, cabbage, Swiss chard, Lettuce, mango, avocado, papaya, banana, orange, lemon, Enset, apple	Cultivable and irrigable land, Proximity to market and main roads	Early and late blight, aphids, white rot, fruit canker, wilt, rust, shortage of pure horticultural planting materials, coffee dieback,	Mostly inorganic fertilizer	Improved horticultural planting materials, continuous assessment, pesticide supplement and training for control measure
7	Ilugelan	Orange, mango, coffee, garlic, beet root, coil cabbage, pepper, potato, tomato, cabbage, carrot, s.potato	Good weather conditions, ecology, d/t horticultural crops diversity	Lack of pure seeds/seedlings, rust, wilt, cut worm, termite, cricates, Anthracnose	organic	Improved horticultural planting materials, Facilitating of market, development of diseases management

4. Conclusion and Recommendation

West and south west Shewa zones are found in Oromia regional state of Ethiopia. The two zones are suitable for growing of various horticultural crops such as Potato, tomato, garlic, onion, carrot, pepper, cabbages, avocado, lemon, apple, banana, Casmir and others. West and south west Shewa zones have different agro-ecologies like mid-altitude (Weyna dega), low-altitude (Qola) and high-altitude (Dega) with different beautiful landscapes and soil types. Various water sources and large fertile lands are available in the two zones even though farmers do not use properly and efficiently. Farmers are faced a lot of problems such as abiotic (lack of pure planting materials, long chain marketing systems and adverse environmental factors) and biotic factors (fungus, bacterial and insects).

Due to those problems, farmers' income decreased from year to year. Similarly consumers also expense most of their incomes to buy agricultural products and exposed to high non reasonable prices. Some farmers try to solve few problems by themselves. For example, Farmers in Dendi district (Werka Gara and Galesa Kofetu locality) left potato tubers in the soil as it is at harvesting period and stored for long time until potato prices increasing at local markets. Some farmers also made association (union) in order to supply their horticultural yields directly at local market (Atkilet tera). They also prepared potato tubers and distributed to farmers as planting

materials with technical support and cooperation of Holeta Agricultural Research center. Farmers try to use their own indigenous cultural methods such as ash, fermented mixture of soap, garlic, animal urine and pepper powder to control early and late blight of potato.

Therefore, holistic horticultural researches will be done in west and south- west Shewa zones of Oromia region in order to develop or apply integrated pest management (IPM) for the control of major pests such as fungal as well as bacterial diseases and insects. Pure and certified horticultural planting materials will be supplied to farmers by adapting and amplifying high yielding varieties to enhance the productivity. Centre mint will be built up with the collaborative of well experienced research centres for long term problem solutions as well as horticultural research continuity. Moreover, since the study areas are potential for horticultural crops, they have to use properly, efficiently and effectively for sustainable economic growth of Oromia region as well as the country.

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Appendix

Survey Format of Horticultural Crops' Constraints and Opportunities in West and Southwest Shewa Zones of Oromia region

Date-----

Name-----Sex-----Kebele-----District-----Zone-----Specific name of the place-----

1. What are the major types of vegetables and fruits cultivate/produce/ in this area? List them-----
2. From where do you get the raw materials? Like seeds, seedlings, etc -----
3. What kinds of fertilizer do you use for vegetable and fruit produces?
A/inorganic fertilizer [DAP, UREA] B/organic fertilizer [compost, green manure, animal dung]
- 3.1. Which types of fertilizer is the best for vegetable and fruit production?
A/inorganic fertilizer B/organic fertilizer
- 3.2. For question 3.1, if you choose A or B, put your reasons -----
4. What are the suitable conditions for vegetable and fruit producers/farmers/around this area? list them-----
5. What are the major problems did you face during vegetable and fruit production time? Mention them-----
- 5.1. How did you solve these problems by using your past trends and local knowledge? Brief them-----
- 5.2. What are the results did you get using your experience and local knowledge? List them-----
6. What types of pests/diseases, insects, and weeds/that damage vegetable and fruit products in your area?-----
- 6.1 List local and cultural pest protection methods in this area?-----
7. is there market shortage for your vegetable and fruit products?
A/yes B/no, if you say yes, what is the solution?-----
8. Which types of fruit and vegetable products more preferable in the market by consumers and have attractive prices?
Mention them-----
9. What is the water source for vegetable and fruit products in your area?
A/rain dependent B/irrigation dependent/like River, stream, pond, spring and others

9.1. Which one is the best for vegetable and fruit products?

A/rain fed B/irrigation, after choosing one of the two, explain your reasons -----

10. What do you need/expect/from research centre /APPRC/, government NGOs and other responsible bodies in order to improve vegetable and fruit products in this area?-----

<<TANKS>>

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