



Opportunities and Potentials of Potato (*Solanum tuberosum* L.,) Production and Future Prospects in Ethiopia

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Abstract:

In Ethiopia, potato production has increased during the “Meher” season as a result of improved varieties, being tolerant to major potato disease, late blight especially in the areas of major potato growing regions of the country. The objective of this review is to study the opportunities and potentials of potato production in Ethiopia. Ethiopia has the most potential of potato production because about 70% of the available agricultural land is suitable for potato production. However, the most challenges of potato production in Ethiopia are due to limited knowledge on seed and ware potato production techniques, lack of improved varieties and germplasm for diverse agro-ecologies, shortage of quality and healthy seed tuber/planting material, diseases and insect pests. So, the respective institutions and researchers should have to develop adapted varieties to different agro-ecological zone, high yielding, and resistance to late blight, early maturing with good quality for taste and market preference.

Keywords: Ethiopia, Potato, Potential, Opportunities

INTRODUCTION

Potato (*Solanum tuberosum* L.), a member of the family Solanaceae and the genus *Solanum*, is one of the most productive and widely grown food crops next to wheat, rice and maize (Golizadeh and Esmaeili, 2012). This crop is grown throughout the world and originated in the high Andes of South America and start to plant Lake Titicaca (Mulugeta and Dessalegn, 2013).

Potato (*Solanum tuberosum* L.) is one of the most productive food crops in terms of yields of edible energy and good quality protein per unit area per unit time (Jessie, 2017). Potato can be promoted as a healthy and versatile component of a nutritious and balanced diet including other vegetables and whole grain foods. From a human nutrition perspective, potatoes are an essential source of energy, protein, and micronutrients like iron and zinc. They also provide key nutrients to the diet including vitamin C, potassium, and dietary fibre. Likewise, in developing countries, it contributes to combat micronutrient deficiency, also referred to as hidden hunger, that is a major global public health problem affecting an estimated 2 billion people globally (Bailey *et al.*, 2015).

The annual world and African production of potato during 2018 was about 368.2 and 26 million tons, respectively (FAO, 2020). Potato is the fastest growing food crop in Sub-Saharan Africa and it is an important crop for food security in parts of Ethiopia by virtue of its ability to mature earlier than most other crops at time of critical food need (Haverkort *et al.*, 2012; Asresie *et al.*, 2015).

Ethiopia is one of the principal potatoes producing countries in Africa and probably displays a unique position for having the highest potential area for cultivating potatoes. In Ethiopia, potato is grown in a wide range of agro-ecological zones, throughout the year using different growing

practices and is considered a “hunger breaking crop” because it can be grown and harvested when cereals don’t mature for consumption other crops fail. Indeed, potato is the only food crop grown to any large extent in the dry season where rain-fall is erratic and unpredictable in the months of March through May (Kolech *et al.*, 2015). Egata (2019) described that among African countries, Ethiopia has the most potential of potato production because of the highlands comprises 70% of the country and home to higher percent of the population. Exploiting these production potentials will make the potato crop to play a key role in ensuring national food security (FAO, 2008). It is an important food crop after cereals, in human diet in developed as well as in developing countries (Kushwaha *et al.*, 2014).

In Ethiopia, potato ranks first in the category of root and tuber crops (RTCs) in terms of area coverage and total production. Crop production survey results of private peasant holding of the year 2019/20 indicated that of the total land areas of about 248,357.51 hectares covered by RTCs, 70,362.22 hectare (~28.33%) and over 1 million tons of potato was produced (CSA, 2020) with an average national yield of 13.140 t ha⁻¹ (CSA, 2019/20).

Currently, potato is produced mainly in the North western, Central and Eastern highlands of Ethiopia (Berhanu *et al.*, 2011). Its production is constrained by a wide range of factors that resulting in low yields. These factors include lack of high yielding varieties tolerant to late blight, poor soil fertility, climatic limitation, inadequate seeds, lack of appropriate cultural practices, poor post-harvest management & storage problems, high cost of farm inputs, diseases and insect pests (Gebremedhin, 2013).

Opportunities and Potentials of Potato Production in Ethiopia

Introduction and evaluation of commercial varieties, introduction and evaluation of germplasm, generation of local population and recently introduction of advance materials are some of the strategies what we have followed to develop varieties widely adaptable, resistant/tolerant to different pests and stresses (Berga *et al.*, 1994). Accordingly, a number of variety trials were conducted in different corners of the country to catch different agro-ecologies of the potato growing areas. From these experiments widely adaptable, late blight resistant and high yielder (25-40 tons/ha) potato varieties were released and under production. So far, about 32 improved potato varieties were released and recommended by the National Potato Improvement Program (EAA, crop variety register, 2018).

Ethiopia has possibly the highest potential for potato production of any country in Africa. Among African countries, Ethiopia has the most potential of potato production because about 70% of the available agricultural land is suitable for potato production which is located at an altitude of 1,500 to 3,000 m.a.s.l with an annual rainfall between 600 and 1,200 mm (MOA, 2010). In recent years, potato production has dramatically increased in Ethiopia by about 96.54 %, from 349,000 tons in 1993 to 863,348 tons in 2010 (FAO, 2013).

Research has been conducted over years and a number of technologies have been selected, developed, released, adopted, and popularized since the establishment of research system in the country (Abebe, 2019). Among which variety development for different agro ecologies, crop pest management technologies, crop husbandry, post-harvest management and food quality appraisals are the major ones.

A number of potato varieties have been developed and released in the country. The first improved variety was released in 1987 (AL-624), since then more than 32 potato varieties were developed and released where as eight potato varieties developed in Europe were also evaluated for their adaptation and yield and registered for production in the country by agricultural research centers and Haramaya University (Gebremedhin, 2013).

Availability of improved technologies eg. Varieties, Management, IDM, etc., growing interests of public and non-governmental organizations in potato seed, increased farmer knowledge of potato seed production and management, high demand for quality seed, and high returns, good networking for intra-regional nuclear seed exchange , strong support of the International Potato center (CIP) and other stakeholders , conducive policy framework , high irrigation potential and conducive market proximity and niche and high yield per unit area as compared to other crops(Abebe,2019).

The emergence of specialized potato seed producers strongly linked with research institutions would enhance the performances and competitiveness of the potato sub-sector. Potato processing is another opportunity for operational upgrading. According to (Chernet Worku, 2019) Ethiopia is one of the largest markets for potatoes in Eastern Africa but relies on informal processing and import of processed products to satisfy its local demand.

Challenges of Potato Production in Ethiopia

The potential of producing sizable potato products appear to be influenced by several constraints. However, the main challenge is related with the seed system of the country. Potato is produced by small-scales individual farmers on fragmented lands following the informal seed system, where the producers used seed of inferior quality (Abebe, 2019). Seed tuber multiplication activities are mainly handled by individual farmers, cooperatives, which often lack even basic amenities for proper multiplication of seed tuber in sizable quantity, and high quality.

The most challenges of potato production in Ethiopia are due to limited knowledge on seed and ware potato production techniques, lack of improved varieties and germplasm for diverse agro-ecologies, shortage of quality and healthy seed tuber/planting material, diseases and insect pests (late blight, bacterial wilt, viruses and PTM), poor agronomic (spacing, fertility, ridging) and irrigation practices, limited capacity (human power, facility and infrastructure) and lack of formal seed system (dominated by informal seed system) (Abebe, 2019).

Weak extension linkage constrained by various financial and other resource limitations to promote and disseminate released potato varieties to the farmer's level. The relationship between farmers and extension services makes it easier for potato production technology to be adopted (Mamaru and Lemma, 2022). Access to Extension: Many research findings throughout time and location agree on the promising relationship between access to extension and technology adoption. Similarly, (Worku, 2014) stated that access to extension was positively influenced by adoption of improved potato technology package.

Towards Future Potato Research and Directions

- Supply of agricultural technologies such as new varieties, proper production practices
- Developing high yielding and diseases resistant varieties of potato for production.
- Development of varieties adaptable to different agro-ecological zone, resistance to late blight, early maturing with good quality for taste & market.

- Disease & insect pest management (IDM, IPM)
- In both rural- and industrial-based systems, innovations resulting from potato research should be incremental through a step-by-step improvement of an existing structure promoting technologies adapted to different agri-food systems.
- Support to the selection and promotion of locally adapted, demand-led potato varieties, combined with rapid seed multiplication techniques.
- Development of pest management options for a more rational use of pesticides and alternative practices such as biological control and decision support tools, combined with integrated cropping systems for sustainable production practices including water and soil fertility management

CONCLUSIONS AND RECOMMENDATIONS

Ethiopia has possibly the highest potential for potato production of any country in Africa. A number of potato varieties have been developed and released in the country. However, the weak extension linkage constrained by various financial and other resource limitations to promote and disseminate released potato varieties to the farmer's level. So, to improve potato production in Ethiopia supplying of agricultural technologies such as new varieties, proper production practices and strengthen extension linkage are paramount.

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