Food Science and Quality Management
ISSN 2224-6088 (Paper) ISSN 2225-0557 (Online)
Vol.57, 2016

A Review on Potato (Solanum tuberosum L.) Production Situations in Ethiopia

Helen Teshome Tesfaye
Wolaita Sodo University, College of Agriculture, Department of Horticulture, P.O. Box 138

Abstract
Ethiopia, with a population of about 81 million, is the second-most populous country in sub-Saharan Africa. Food insecurity is a major and ever worsening problem. Potato has been considered as a strategic crop by the Ethiopian government aiming at enhancing food security and economic benefits to the country as, potato has a high potential to supply a cheap and quality food within a relatively short period. Ethiopia is one of the principal potato producing countries in Africa. Central, Eastern, North-Western and Southern regions, constitute approximately 83% of the potato farmers in the country. Most of the available agricultural land is suitable for potato production.
Keywords: Potato, Production, Ethiopia

Introduction

About 85% of the Ethiopian population, residing in the rural area, is engaged in agricultural production as a major means of livelihood. However, Ethiopian agriculture is characterized by low productivity and over the last decades it has been unable to produce sufficient quantities to feed the rapidly growing population of the country. In fact, natural calamities, food insecurity and famine seem to have become the salient features and critical problems of the country [1].

Ethiopia, with a population of about 81 million, is the second-most populous country in sub-Saharan Africa. Food insecurity is a major and ever worsening problem. Underlying causes include rapidly increasing population pressure, low productivity of the agricultural sector, widespread environmental degradation and recurrent droughts [2].

Potato is regarded as a high-potential food security crop because of its ability to provide a high yield of high-quality product per unit input with a shorter crop cycle [3]. Potato can play an important role in improving food security and cash income of smallholder potato growers in Ethiopia. As a food crop, potato has a high potential to supply a cheap and quality food within a relatively short period. Potatoes are the perfect food and one of the few that can actually sustain life on its own. Potato is a well-balanced major plant food with a good ratio between proteins and calories, and has substantial amounts of vitamins, especially vitamin C, minerals, and trace elements. Moreover, it has the correct balance of protein calories and total calories. It is considered to be one of the cheapest sources of energy and the production of protein per unit land is the highest among the four major food crops (rice, maize, wheat and potato) [4].

Potato has long been regarded as a lowly subsistence crop and is still an underexploited food crop. Potato has huge potential to improve food security, income and human nutrition and it is in Ethiopia where the potential of this crop is increasingly being realized and explored by farmers, private investors, and policy makers. While, national average yields are still far below attainable yields, ample opportunities exist to unleash this crop's potential for increased food security and income generation [5].

Potato has been considered as a strategic crop by the Ethiopian government aiming at enhancing food security and economic benefits to the country. As the population grows rapidly, increased productivity of potatoes can improve the livelihood of smallholder potato farmers and is required to meet the growing demand [6]. The potato subsector is potentially of great importance for pro-poor growth since it is the best option for many households to generate income in Ethiopia. Potato production could fill the gap in food supply during the hungry months of July to August before the grain crops are being harvested [7].

Ethiopia is one of the principal potato producing countries in Africa and probably displays a unique position for having the highest potential area for cultivating potatoes [8]. The result of this review study showed Ethiopian potentially for potato production and factors affecting the production system. These consists lack of wide adaptive improved potato varieties, unavailability of improved storage facilities, the high cost of improved seed tuber, inappropriate agronomic practices, low price of produced tuber especially immediately during harvest and lack of marketing and suitable post-harvest management facilities, pests and disease

Major Potato Production Area in Ethiopia

In Ethiopia, potato is grown in four major areas: the Central, the Eastern, the North-Western and the Southern regions, which together constitute approximately 83% of the potato farmers in the country [9].

In the Central area, potato production includes the highland areas surrounding the capital, i.e. Addis Ababa. In this area the major potato growing zones are West Shewa and North Shewa About 10% of the potato farmers are located in this area [9]. Average productivity of a potato crop ranges from 8 to 10 Mg ha-1 which is

higher than the productivity in the North-Western and Southern areas. This higher productivity might be due to the use of improved varieties and practices obtained from Holetta Agricultural Research Centre in the central area. In the central area potato is produced mainly in the belg (short rain season-February to May) and meher (long rain season-June to October) periods. Potato is also grown off-season under irrigation (October to January). Because of the cool climate and access to improved varieties, farmers in this area of the country also produce seed potatoes which are sold to other farmers in the vicinity or to NGOs and agricultural bureaus to be disseminated to distant farmers. In the central area, farmers grow about seven local varieties, eight improved varieties and six clones (i.e. genetic material which is not officially released) [3].

The Eastern area of potato production mainly covers the Eastern highlands of Ethiopia, especially the East Harerge zone. Only about 3% of the total number of smallholder potato producing farmers in Ethiopia grow potato inhabit in this area [9]. However, the area is identified specifically because the majority of the potato farmers' in this region produce potatoes for the market and the farmers have also access to export markets in Djibouti and Somalia. Potato is mainly grown under irrigation in the dry season (December to April). This season is characterized by low disease pressure and relatively high prices [10b] Potato is also produced in the belg (February to May) and the meher (June to October) seasons. Most farmers grow local potato varieties. However, some farmers in the vicinity of Haramaya University in the Eastern area and farmers who are targeted by NGO seed programmes have access to improved varieties [10a]. Despite the use of local varieties, the productivity of potato in this area is equivalent to the productivity in the Central area. This might be due to good farm management practices triggered by the farmers' market orientation [3].

The North-Western area of potato production is situated in the Amhara region. It is the major potato growing area in the country, accounting for about 40% of the potato farmers [9]. South Gonder, North Gonder, East Gojam, West Gojam and Agew Awi are the major potato production zones in this region. Farmers mainly grow local varieties. Productivity ranges from 7 to 8 Mg ha-1. In this area, the largest volume of potato is produced in the dry season using irrigation as well as during belg (short rainy) season. Potato is also produced in the Meher (main growing) season. Data on genotype use in the Awi district show that there were 21 potato genotypes grown, of which 67% are local varieties. Ninety percent of the farmers grow these local varieties [3].

The Southern area of Ethiopia in which potato is grown, is mainly located in the Southern Nations', Nationalities' Potato Production System (SNNPRs) comprises all processes and activities (land preparation through harvesting) undertaken to produce ware or seed potatoes and Peoples' Regional State (SNNPRs) and partly in the Oromiya region. The major potato producing zones in this area are Gurage, Gamo Goffa, Hadiya, Wolyta, Kambata, Siltie and Sidam a in the SNNPRS and West Arsi zone in Oromiya. More than 30% of the total number of potato farmers is located in this area [10b]. Potato tubers are produced under rain-fed conditions and under irrigation. Productivity usually ranges from 7 to 8 Mg ha^{-1} where as in some places potato productivity is even below 7 Mg ha^{-1}. About six varieties are grown, of which four are local and two are improved [15].

Opportunities and Challeges of Potato Production in Ethiopia

Ethiopia has possibly the highest potential for potato production of any country in Africa. There is a high potential to expand the cultivation area of the potato crop, as 70% of the country's arable land has potentially suitable to potato cultivation [11]. Currently, only 2% of the potential area in Ethiopia is under potato production and the average productivity of potato is less than 10 Mg/ha. Most of the available agricultural land is located at an altitude of 1800-2500 m.a.s.l and receive an annual rainfall of more than 600 - 1,200 mm, which is suitable for potato production [12].

The low acreage and productivity of potato in Ethiopia are attributed to many factors. The major ones are lack of well adapted and high-yielding cultivars, unavailability and high cost of seed tubers, inappropriate agronomic practices, and lack of marketing and suitable post-harvest management facilities, pests and disease [13] [14] [15] [16]. [17] Also described that lack of varieties with stable and high yield potential, lack of good quality seeds, disease and pest problems, drought and seed dormancy to fit the local cropping calendar, lack of improved characterization and *ex situ* conservation of potato genetic resources are very important limitations to potato production by smallholder farmers in sub-Saharan-Africa. Several varieties of potato are grown by farmers some of which are local and others are improved varieties. According to [14], 98.7% of the seed tubers required in Ethiopia are supplied from the local varieties. The seed tubers supplied by this system have poor sanitary, physiological, physical and genetic qualities [13] [14] [3].

The yield gap between attainable and potential yield of potato in Ethiopia is very high. A study by [19] in Ethiopia on bacterial wilt finds out that disease are one of the most important factors that contributes to this high yield gap in the country. According to [19], the contribution of diseases to the gap between the production potential and the current average national production takes a large part since potato crop is susceptible to a number of diseases including late blight, viruses and bacteria wilt. This same study indicated that mid-altitude areas of the country around Shashamene, Bako, Jima and Rift Valley are most affected by bacterial wilt. According to [18], sub-optimal agronomic practices are also the other most important factor contributing to this potato yield gap.

Furthermore, the use of local varieties is one and the most important factors which contribute to the low yield of potato in Ethiopia. This is because; the local varieties are susceptible to late blight and of course low yield potential [20]

Conclusion

Ethiopia has suitable condition for potato production and Potato can play an important role in improving food security and cash income of smallholder potato growers in Ethiopia. As a food crop, potato has a high potential to supply a cheap and quality food within a relatively short period. There is a high potential to expand the cultivation area of the potato crop in Ethiopia. While, national average yields are still far below attainable yields, ample opportunities exist to unleash this crop's potential for increased food security and income generation in Ethiopia.

Reference

1. Belay K. (2003). Agricultural extension in Ethiopia: the case of participatory demonstration and training extension system. J. Soc .Develop. Afri. 18(1): 49-60.
2. CIP (International Potato Center), 2012.Tackling food insecurity and malnutrition in Ethiopia through diversification. www.sweetpotatoknowledge.org
3. Adane Hirpa, M.P.M. Meuwissen, A Tesfaye., W.J.M. Lommen, A.O. Lansink, A. Tsegaye and P.C. Struik, 2010. Analysis of Seed Potato Systems in Ethiopia. *American Potato Research Journal*. 87: 537-552.
4. CIP (International Potato Center) and FAO (Food and Agricultural Organizations of the United Nations, Potato in the 1990s. Situation and prospects of the world potato economy. Food and Agricultural organization of the United Nations. 1995, Rome, 39pp.
5. Teklemariam T., 2014. The Impact of International Potato Center's Nutrition Project on Smallholder farmers' Income and Adoption of Improved Potato Varieties: Tigray region, Northern Ethiopia MSc thesis.
6. Gildemacher, P.R., W. Kaguongo, O. Ortiz, A. Tesfaye, W. Gebremedhin , W.W. Wagoire, R.Kakuhenzire, P.M. Kinyae, M. Nyongesa, P.C. Struik and C. Leeuwis, 2009. Improving Potato Production in Kenya, Uganda and Ethiopia: A System Diagnosis. *Potato Research* 52: 173-205.
7. CSA (Central Statistical Agency of Ethiopia) (2002). Statistical Report on Area and Production of crops part III. Results for Tigray Region. Addis Ababa. Ethiopia.
8. EARO (Ethiopian Agricultural Research Organization) (2000): *Potato Long Term Research Strategy*. Addis Ababa, Ethiopia.
9. CSA (Central Statistical Agency), 2008/2009. Agricultural sample survey: Report on area and production of crops, Addis Ababa, Ethiopia. 126p.
10. a Eshetu Mulatu, O. Ibrahim and E. Bekele, 2005a. Improving potato seed tuber quality and producers livelihoods in Hararghe, Eastern Ethiopia. *New Seeds Journal.* 7(3): 31-56.
    b Eshetu Mulatu, O. Ibrahim and E. Bekele, 2005b. Policy challenges to improve vegetable production and seed supply in Hararghe, Eastern Ethiopia. *Vegetable Science Journal* 11(2): 81-106.
11. Gebremedhin woldegeorgis, E. Gebre and B. Lemaga, 2008. Potato variety development. pp. 15-32. In Root and tuber crops. *Ethiopian Institute of Agricultural Research.*
12. Yilma, S. 1991. The Potentials of True Potato Seed in Potato Production in Ethiopia. Actae Horticultrae 270: 389-394.
13. Berga Lemaga, G. Hailemariam and G. Woldegiorgis, 1994. Prospects of seed potato production in Ethiopia. pp. 254-275. In: E. Hareth, D. Lemma (ed.). Proceedings of the Second National Horticultural Workshop of Ethiopia. EARO-FAO, Addis Ababa, Ethiopia.
14. Tekalign Tsegaw, 2005. Response of potato to Paclobutrazol and Manipulation of Reproductive Growth under Tropical Conditions. A Ph.D. Dissertation presented to the department of production and soil science. University of Pretoria. 164p.
15. Endale Gebre, G. woldegeorgis and B. Lemaga, 2008. Potato seed management. pp. 53-78. In Root and tuber crops. *Ethiopian Institute of Agricultural Research*.
16. Gildemacher, P.R., W. Kaguongo, O. Ortiz, A. Tesfaye, W. Gebremedhin , W.W. Wagoire, R. Kakuhenzire, P.M. Kinyae, M. Nyongesa, P.C. Struik and C. Leeuwis, 2009. Improving Potato Production in Kenya, Uganda and Ethiopia: A System Diagnosis. *Potato Research* 52: 173-205.
17. Fuglie, K.O., 2007. Priorities for potato research in developing countries: results of a survey. *American Potato Research Journal.*84: 353-365.
18. Gebre, E. and G.W. Giorgis, 2001. Effects of spatial arrangement on tuber yields of some potato cultivars. Afr. Crop Sci. J., 9: 67-76.
19. Aliye, N., C. Fininsa and Y. Hiskias, 2008. Evaluation of rhizosphere bacterial antagonists for their potential to bioprotect potato (*Solanum tuberosum*) against bacterial wilt (*Ralstonia solanacearum*). Biol. Control, 47: 282-288.
20. Getachew, T. and A. Mela, 2000. The role of SHDI in potato seed production in Ethiopia: Experience from

Alemaya integrated rural development project. Proceedings of the 5th African Potato Association Conference, Volume 5, May 29-June 2, 2000, Kampala, Uganda, pp: 109-112.