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The role of Urban Agriculture in food security in Debre Berhan Town, North Shoa, Central Ethiopia

[1]Tilahun Tolossa and [2]Adelegn Bogale

[1]Department of biology, Ambo University, Oromia, Ethiopia, P.O.BOX 19
[2]Department of biology, Ambo University

Corresponding Author: Tilahun Tolossa, E-mail. tilahun.tolesa@yahoo.com

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Background: Urban agriculture plays great in food securing urban farmers in particular and urban dwellers at large to grasp the significance of the sector towards urban environments.
Methods: the study focused on identifying the major types of urban agriculture in Debre Berhan Town, identifying stakeholders involved in urban agriculture, and environmental role of urban agriculture. Both qualitative and quantitative approaches were used. And 16 individual farmers and 17 micro and small enterprise samples were taken by simple random sampling technique. In addition to this, 8 urban agriculture office officials were taken by Non Probability/purposive sampling technique from governmental organizations. Empirical data was collected through structured questionnaire from experts, interview guiding questions from urban farmers and through observation from the field.
Results: Accordingly, the findings show that carrot (*Daucas carota*) and potato (*Solanum tuberasum*) are the most commonly cultivated vegetables in Debre Berhan Town.
Conclusion: the study revealed that composting of both municipal solid waste and household waste for urban agriculture is a neglected activity which would have been used for augmenting of soil fertility instead of polluting the urban environment.
Key Words: Debre berhan, food security, livelihood, urban agriculture

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BACKGROUND

Urban agriculture applies intensive production methods, frequently using and reusing natural resources and urban wastes, to yield a diverse array of land-and, water-, contributing to the food security, health, livelihood, and environment of the individual, household, and community (Smit *et al,* 2001; Bulter and Moronek ,2002; Cofie, 2009) It is the practice of cultivating, processing, and distributing food in or around a village, town, or city (Bailkey and Nasr*,* 2000). Urban agriculture can also involve animal husbandry, aquaculture, agroforestry, urban beekeeping, and horticulture. These activities occur in peri-urban areas as well (Hampwaye *et al.,* 2013).

Urban agriculture in Ethiopia by (Auxumite, 1994; Lee, 1997 *)* stated as the livelihoods of many urban citizens in Ethiopia is heavily dependent on urban farming, but urban policy makers fail to give due attention to urban agriculture during urban planning policy reforms.

The urban agriculture also has numerous benefits in terms of environmental sustainability. Besides beautifying

city landscapes, urban agriculture can also aid environmental restoration and remediation through reusing abandoned areas, vacant lots, and certain waste streams, such as yard waste compost, from the urban landscape. A greener urban landscape can also provide psychological, emotional, and general health benefits (Beatley, 1997*)*. So, the concern of this study was to assess food security and environmental role of urban agriculture around Debre Berhan Town.

METHODS AND MATERIALS

Study Area

The study was conducted in Debre Berhan town from September 10-November 30, 2017. The town is located 9°45′N latitude 39°31′E longitude, 130km far from finfinne in the north direction. Debre Berhan is situated on plateaus in the central Ethiopia highland at average elevation of between 2800 and 2845 above sea level (seyom, 2007). The temperature of Debre Berhan town is in average between 6.6°c-24°c; and average rainfall is 964mm and the climate is totally highland. The 1994 national census reported a total population of 38,717 in 8,906 households (in 9 kebeles), of whom 17,918 were men and 20,799 were women. The largest ethnic groups reported in the town were Amhara (90.12%) and oromoo (3.94%).

Sampling Techniques

In this study both probability and non-probability sampling design was used to obtain reliable data. Non- probability / purposive sampling technique was applied to collect data from the concerned officials of government institutions such as Debre Berhan town urban agriculture and environmental protection and land management and use office, Debre Berhan Town technique vocation and enterprise office, North Shoa zone environmental protection and land management and use department, Debre Berhan Town municipality office. Key informants were purposively selected from urban agriculture and environmental protection and land management and use office, Technique vocation and enterprise development office and town municipality. Simple Random samplings technique was applied to collect data from individual urban farmers and micro and small enterprises.

Study population

In Debre Berhan Town there are 162 individual urban farmers and 17 micro and small enterprises. To take those of all individual urban farmers, micro and small enterprises and agricultural office experts was exhaustible and economically costly. Therefore, according to (Curry, 1984) 16 individual urban farmers and 17 micro and small enterprises were taken by simple random sampling technique to reduce time wastage and to get reliable data. In addition to this, 8 urban agriculture office officials were taken by Non-Probability/purposive sampling technique.

Methods of Data Collection

The data was collected using both primary and secondary data source. Primary data was gathered through various techniques of data collection methods such as field observations, urban farmer survey (individuals and enterprises), intercept (individual) interview, questionnaire and key informants for doing descriptive research. Secondary data sources for the study was also gathered from the documentations of urban agriculture office, small and micro enterprise office, environmental protection and land use office and municipality office annual plan and reports, abstracts and previous research results was used.

Data Analysis

The quantitative and qualitative data was present as descriptive statistics. Quantitative data was analyzed based on editing, tabulation, and then generating frequencies, percentages on back ground information of respondents, and type (kinds of vegetables). Descriptive method of data analysis such as: Percentages, frequency, was employed to analyze data collected quantitatively. The data was managed through the use of computer Microsoft ware (Microsoft EXCLE).

RESULTS AND DISCUSSION

Sex Composition of Individual Urban Farmers

As shown in the figure 1, the sex compositions of urban farmers were 62.5% males and 37.5% females. The result shows that the number of male urban farmers was higher as compared to female urban farmers. Men are dominantly participating in the urban farming in the town.

Educational Level of Urban Farmers

Concerning the educational status of the respondents, 18.75% were illiterates and 12.5% can read and write, 18.75% of respondent attained primary school (1-8) and 37.5% secondary school and 12.5% preparatory schools

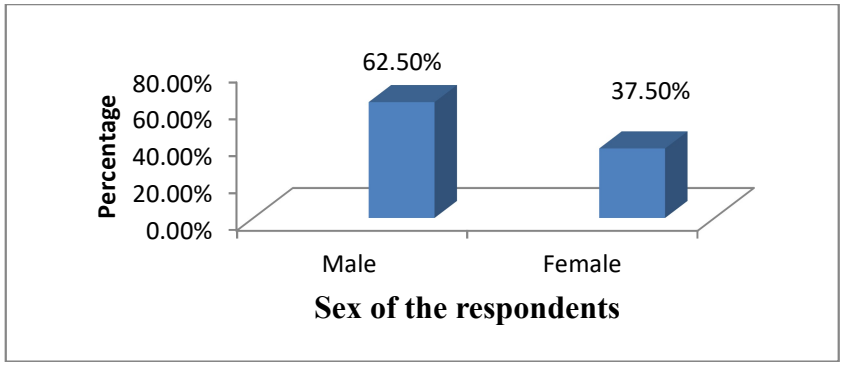

Figure 1. Sex proportion of the respondents

Table 1. Educational Level of Respondents

S .no	Level of education	Frequency	Percentage (%)
1.	illiterate	3	18.75
2.	Read and write	2	12.5
3.	Primary school (1-8)	3	18.75
4.	Secondary school (9-10)	6	37.5
5.	Preparatory (11-12) and above	2	12.5
	Total	16	100.00

and above attended education respectively (table 1). The majority of respondents were found in secondary school. The study showed that educated people that were able to enjoy better job were engaged in urban farming to generate income as a source of job opportunity, hobby, environmental beautification and livelihood.

Marital Status of Urban Farmers

From the field survey out of all (16) individual urban farmers 18.75% (with frequency 3) were single (unmarried), 62.5% (with frequency 10) were married, 6.25% (with frequency 1) have divorced and 12.5% (with frequency 2) were widowed. From this figure 2 it was possible to discuss that majority of urban farmers were married and participated in urban farming because the family interaction is high and needs to enjoy with the activity in their backyard during home stay.

Family Size of Urban Farmers

The family size of the sampled population of urban farmers who participated in responding questionnaires in the town were 36 males, 32 females and total 68 families. The study found that urban farmers involved in the urban farming were with large family size, due to the fact that the urban farmers need additional income besides their permanent income. So, they involved in urban agriculture to supplement family's food requirement and for the purpose of job opportunity.

Major Types of Urban Agriculture in the Study Area

The agricultural activities practiced in Debre Berhan Town can be categorized in to three main groups: Vegetable and fruit production, livestock rearing and mixed farming. In the present context, mixed farming means practicing both crop cultivation and livestock production together. Findings from Debre Berhan Town urban agriculture and environmental protection and land management and use office indicated that urban farmers were participated in different types of urban agriculture such as cattle keeping, milk production, sheep fattening, cattle production, fruit and vegetable production. The vegetables grown by individual farmers were mainly used for self consumption and marketing. Simple cultivation techniques were mostly used and the productivity is

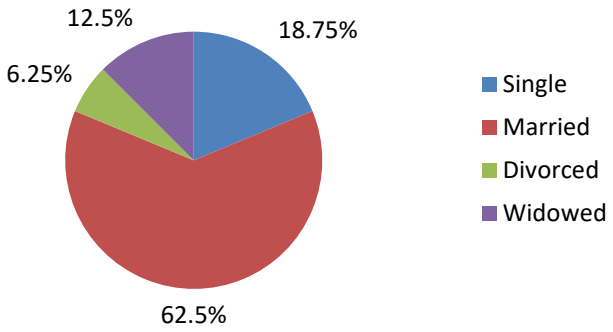

Figure 2. Marital status of urban farmers

minimal. Vegetable production was a subsistence (micro-level) activity practiced by urban farmers. From different types of urban agriculture in the town, vegetable productions were practiced at the backyard of the urban farmers and at the place of agricultural land use subdivision areas. As one can easily observes from the plate the activities were small and very traditional and pursued for subsistence life by the poor and better-off urbanites. Children were looking after cattle and feeding them during off school to support their family as well as job seekers would be employed by better-off to perform farming activities. There were about 17 different micro and small enterprises of urban agriculture that performed cattle fattening, sheep fattening, and animal rearing, and vegetable production having a minimum of 8 hectare constant land. The study also found that 20% of urban farmers were doing their urban farming in the intra-urban at the backyard vacant and under-utilized land areas that are or can be used for UA, including areas not suited for building (along streams, rivers, etc.), public or private lands not being used (lands waiting for construction) that can have a temporary use, community lands. While the rest, 80% urban agricultural activities takes place in the border of the town (peri-urban).

Types of Vegetable Production Systems and Commonly Cultivated Vegetables

A variety of vegetable are grown in Debre Berhan Town, either for home consumption, for sale or both. Cultivating a variety of vegetables was found to be the most common practice in Debre Berhan Town. Carrot (*Daucas carota*), cabbage (*Brassica oleracea*), potato (*Solanum tuberasum*), lettuce (*Catuca sativa*) and *nech shinkuret* (*Allium sativum*) were the most commonly cultivated vegetables. Furthermore, other different kinds of vegetables were cultivated in this town such as; *red shinkuret* (*Allium cepa*), beet root (*Beta vuligaris*) and spinach (*Spinach olearacea*). Many vegetable producers either micro and small enterprises or individual urban farmers were reported that they cultivate vegetables mainly for selling (marketing) of the products.

Vegetable production in Debre Berhan town was performed by individual farmers and micro and small enterpriser's using irrigation systems (as bereesa river and two other dams) and during meher or summer season. However, most urban agriculture farming practices performed in Debre Berhan town was through irrigation systems.

Results in figure 3 shows or describes the most commonly cultivated vegetables, the amount of vegetables produced and the types of vegetables commonly cultivated in Debre Berhan town (high land vegetables) through irrigation systems.

The following table (2) describes the most commonly cultivated vegetables, the amount of vegetables produced and the types of vegetables commonly cultivated during meher (kiremt) or summer starting from mid-June to mid-September with heavy rain and mostly cloudy.

Problems Facing During Urban Farming

As many scholars already studied that urbanization is rapidly increasing from year to year. As a result space for urban agriculture is becoming in shortage. The study showed that majority of urban farmers (respondents) have faced shortage of space or lack of (resources) access to farming land as well as to farming in puts such as seeds and commercial fertilizer. Different research done elsewhere also confined with the finding of this paper (Bryld, 2003; Bryceson and Potts ,2005; Edwards, 2010).

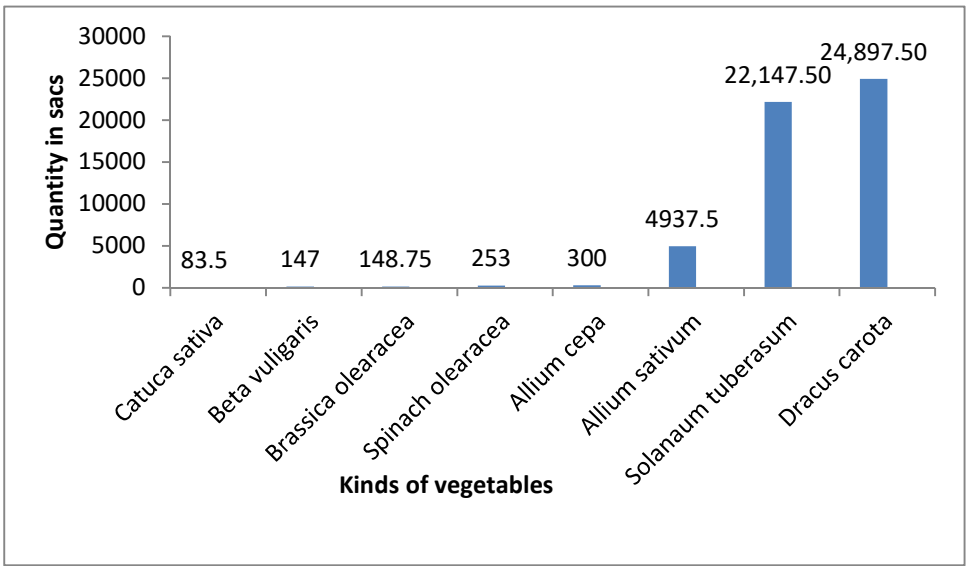

Figure 3. Vegetables cultivated through irrigation systems
Source: Debre Berhan town administration environmental protection land administration office, 2006

Table 2. Vegetable products during *meher* (summer) season

Vegetables	Quantity in sacs	Percentage (%)
Carrot(Daucas Carota)	758.1	16.5
Niche shinkurt(*Allium sativum*)	1120.85	24.3
Potato(*Solanum Tuberasum*)	2725	59.2
Total	4603.95	100.00

Source: Debre Berhan town administration environmental protection and land administration office, 2018

Environmental Role of Urban Agriculture

The study found that urban farmers agreed on the benefits of urban agriculture could deliver to them as it reduces urban heat, for consumption, waste recycling or reuse, reduce soil erosion/degradation, for green biodiversity enrichment, increase water availability, environmental beautification and reduction of storm water runoff and the rest for other benefits. The urban agriculture contributes many role to Debre Berhan Town as nutrition (food) and environmental benefits besides to economic and social benefits. Debre Berhan Town has favorable climatic condition for urban agriculture such as fertile soil, and optimum rain fall; due to these the areas were green throughout the year. The report of World food organization shows that urban agriculture has a great role in securing food for low income society as well as making good environment (FAO, 2016).

Food Security

Urban food security were depends primarily on rural agricultural production. Nevertheless, due to the low productivity of the rural agriculture and less effective market chain between the rural and urban people, urban and peri-urban food production tends to increase in Debre Berhan Town to manipulate vegetable consumption and to get enough money. Urban and peri-urban farming was one of the alternatives to supplement food supply to tackle food shortage to supplement household income. Engagement in urban agriculture also provides direct employment for two categories of people: members of the farming households and hired laborers (Foeken and Malongo, 2004).

CONCLUSIONS

The major urban agricultural production systems in the town were identified. The role of urban agriculture in household income and urban poverty alleviation, and problems facing in relation to urban farming were investigated. The urban farmers produce a variety of vegetables for home hold use and marketing. Urban agriculture in Debre Berhan town doesn't different from the rural area of Ethiopia, because the urban farmers in

Debre Berhan town use traditional tools and ways, extensive labour and irrigation systems to cultivate their vegetables. Manure and wastage are more commonly used substrates in common production of vegetables. The study has also revealed that the farmers used different strategies to access land, which is one of the critical assets for urban farming. Participation of the youth is relatively low in the sector, leaving it for adults over 40 years old and women who also support large families. Despite its dominant contribution to livelihoods of the urban farmers, urban agriculture is strikingly found to remain as a survival strategy for the urban poor and a source of income for the rich households.

Urban farmers have to adopt modern technologies like, drip irrigation to save scare water, inter cropping to get maximum return per unit area and minimize risk of vegetables product failure and planting multi-purpose vegetable species to generate income and to enhance urban environment as agro-forestry in their plots.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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