

Determination of Yield Produced Per 50kg Sacks for Selected Vegetable Crops Grown in Multistorey Gardening at Menschen Für Menschen Foundation Agroecology Department Demonstration Site, Harar, Ethiopia

Birhanu Messele

Department of Agroecology (Crop production stream), Agro-Technical and Technology College, Ethiopia

Submission: February 22, 2016; **Published:** March 10, 2016

***Corresponding author:** : Birhanu Messele, Department of Plant Sciences, Menschen fur Menschen Foundation, Agro-Technical and Technology College, Harar, P.O. Box: 322, Ethiopia, Tel: +251911393713; Fax: 025-66-37-37; Email: birhanmartha@gmail.com

Abstract

The study was conducted at Menschen fur Menschen Foundation Agro Technical and Technology College Demonstration site, Harar, Ethiopia from October, 2015 to February, 2016. The experiment was conducted to determine the yield produced per 50kg sacks filled with a moist and rational mixtures of well fertilized soils for selected vegetable crops grown in multistorey gardening. The experiment consisted of three types of vegetable which were grown each in three 50kg sacks filled with a moist rational mixture of well fertilized soils. Thus, a total of nine 50kg sacks were used for this study.

Results of this study indicated that the yield per 50kg sacks filled with moist rational mixtures of soils resulted in 5.0, 4.5 and 7.0 kg for lettuce, Swiss chard and Tomato respectively. As a recommendation, the study suggested that there is a need for more promotion of multi-storey gardens as an urban farming technology to increasing food production for home consumption for disadvantaged groups such as immigrants, HIV-AIDS affected households, disabled people, female-headed households with children, elderly people without pension. This will avert food security problem in the country by having continuous food supply throughout all seasons.

Keywords: Vegetable crops; Agroecology

Introduction

About half of the world population lives in urban areas. It is estimated that, by 2020, the developing countries will account for about 75% of all urban dwellers [1]. Ethiopia has a high rate of urbanization; averaging about 4.3% per annum. About 30% of urban population is concentrated in the capital and primate city, Addis-Ababa [2]. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Harari has a total population of 183,415, of whom 92,316 were men and 91,099 women. This region is the only one in Ethiopia where the majority of its population lives in urban area: 99,368 or 54.18% of the population are urban inhabitants. With an estimated area of 311.25 square kilometers [3] this region has an estimated density of 589.05 people per square kilometer. Even though, urbanization brings a number of socio-economic benefits, the rapid increase in urban population brings a number of challenges in housing, infrastructure, facilities

poverty and hunger, and employment. Some cities have adopted urban agriculture as a strategy to address the increasing urban unemployment, poverty and hunger. This is because urban agriculture supports food security and nutrition, provides employment and generates income for the urban poor in general and the disadvantaged groups such as women, the disabled, the elderly and the unemployed youth [4]. According to Margaret Armar-klemesu [5], about 200 million urban dwellers in the world participate in urban farming and the sector provides about 800 million people with at least some of their food.

The contribution of urban agriculture to food security and healthy nutrition is an important asset. It can be considered by the urban poor who are faced by the challenges of inadequate, unreliable and irregular access to food, and the lack of purchasing power. It has been considered an important source of income for a substantial number of urban households when they grow their own food and sell the surplus [6,7].

The use of multi-storey gardens is an important technology in urban agriculture as it utilizes the vertical dimension to increase the cropping area. The gardens are made from Sacks, tires and crates among others where the crops are grown in stairs. This technology may function as an important strategy for poverty alleviation and social integration of disadvantaged groups such as immigrants, HIV-AIDS affected households, disabled people, female-headed households with children, elderly people without pension and youngsters without a job by integrating them more strongly into the urban network, providing them with a decent livelihood and preventing social problems [8]. Moreover, multistorey gardening is a simple farming technology, which is aimed at producing vegetables to supplement the food basket for micronutrient provision. In Ethiopia there is little information about the use multistorey gardening for family level vegetable production and food security.

Therefore, the objective of this study was:

- To determine the yield produced per 50kg empty sacks filled with rational mixture of soils for lettuce, Swiss chard and tomato.

Materials and Methods

Description of the study site

The study was conducted in the Harare National Regional State at Menschen für Menschen Foundation of Agro- Ecology department demonstration site from October, 2015 to February, 2016. The experimental site is located on the geographic coordinate of latitude 9° 20' north and at longitude of 42 °09' east. The altitude of the site is around 1900m.a.s.l. The mean annual rainfall of the area is 450-1110mm with a bimodal distribution and the average temperature is 11-28°C.

Experimental Procedures

Treatments: The experiment consisted of three types of vegetable which were grown each in three 50kg sacks filled with a moist rational mixture of well fertilized soils. Thus a total of nine 50kg sacks were used for this study.

Setting up multi- story gardens: A rational mixture of poultry/dairy manure, sand, and clay was prepared. After it was mixed thoroughly, water was applied on it until it became moist. The mixture was filled with nine 50kg empty cereal bags. Each crop was grown on 50kg empty cereal bags. The bags were fold back and filled with small stones up to 15cm the bottom and center of the bag. Finally, small poles around bags were made so as to improve the circulation of air.

Seeds and seedlings production: Treated vegetable seeds of Lettuce, Swiss chard and Tomato were used for the study. The vegetable seeds of the aforementioned crops were sown each on three 50kg bags filled with the moist rational mixture soils and

then water was applied regularly for about 3-4 weeks. Partial shading should be done where the climate is harshly hot. When seedlings were ready for transplanting, holes were made on the sides of the bag with a sharpened stick, at a spacing of 30cm from row to row and 23cm from plant to plant in a staggered fashion. Seedlings were transplanted to nine 50kg bags filled with the rational mixture and moist soils.

Agronomic practices

Watering: After transplanting, watering was done in the evening or morning time for a period of two months. Each bag was watered twice daily with 5 liters of water each time for the first 2 weeks, then 2-3 times a week in the remaining period. The Water was applied at the top center of the bag, going down the central core, to the end of the bag irrigating all the plants.

Hoeing: The soils of 50kg sacks were ploughed with a hand held implements to improve aeration and infiltration of water.

Weeding: Weeds grown in 50kg sacks were removed by hand weeding. The multistory garden was weeded 3 up to 4 times until harvesting.

Harvesting: Green leafy vegetables grown in a multi storey garden were matured within 30-45 days while the tomato was harvested 60 days after it was transplanted to 50kg sacks. Harvesting in multi-storey gardens was done 2-3 times a week for Swiss chard.

Data Collection

Yield: After harvesting the fresh vegetable, yields of Lettuce, Swiss chard and Tomato were determined by measuring the plants grown in three 50kg sacks and weighing on a sensitive electronic balance. Finally, the average yield of each plant was taken.

Statistical analysis

A simple descriptive statistics was used to study the average yield obtained from each 50kg sacks filled with a moist and rational mixture of well fertilized soils.

Results and Discussion

Results of this study (Table 1) indicated that the yield per 50kg sacks filled with a moist rational mixtures of soils were 5.0, 4.5 and 7.0kg for lettuce, Swiss chard and Tomato respectively. Vegetables make an important component in achieving a balanced diet and according to FAO [9] this is a major challenge in many families especially those in the urban setting where they rely on the market to meet their daily needs. According to this study installation of three up to five 50kg empty sacks as multistory gardens with a rational mixture of soils will fulfill the vegetable needs of family members.

Table 1: Average yield of Lettuce, Tomato and Swiss chard grown in 50kg sacks multistory garden.

Number	Types of vegetables	The mean yield per 50kg sacks(kg)
1	Lettuce	5.0
2	Swiss chard	4.5
3	Tomato	7.0

Recommendations

There is a need for more promotion of multi-storey gardening as an urban farming technology to increase food production for home consumption for disadvantaged groups such as immigrants, HIV-AIDS affected households, disabled people, female-headed households with children, elderly people without pension. This will avert food security problem in the country by having continuous food supply throughout all seasons.

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