

Establishment of Organic Terrace Garden and Cultivation of Nutritious Vegetables

K.Chitra

Department of Botany, Bharathiar University, Coimbatore, Tamilnadu, India.
drkchitraa@gmail.com

Abstract:

In urban areas garden spaces are reduced in size everyday due to human impact on ecosystem. People living in urban and peri-urban areas don't have enough space for kitchen gardening or home gardening. The only places that one can grow their own vegetables are terraces and balcony. The main aim of this study is to create awareness on all aspects of growing own organic vegetables and establishment of organic terrace garden. For the establishment of organic terrace garden, space was selected in the department of Botany, Bharathiar University, Coimbatore. The area was covered by using green shade nets. Different sizes of grow bags were selected for the cultivation of vegetables, fruits, greens and medicinal plants. The organic fertilizers and manures like vermicompost, Farm Yard Manure, panchagavya, NPK consortium were used. Neem oil was used to control the pests. Drip irrigation setup was placed in the terrace garden for irrigating the plants. The ornamental plants were planted in the hanging pots and plastic pots to beautify the environment. Students are motivated and trained for the establishment of organic terrace garden and cultivation of vegetables.

Keywords: urban areas, terrace garden, organic fertilizer and manures, neem oil, drip irrigation ornamental plants,

Introduction:

Education and awareness have brought new wave of change to people for the consumption of organic vegetables and fruits worldwide. People are trying to eat more organic products rather than pesticide contaminated vegetables and fruits. They want to protect their family as well as environment. But the organic products costs are very high. So, there is a chance to get rid of contaminated foods and high-priced organic vegetables and fruits through organic terrace gardening [1]. Building terraces can be utilized for the cultivation of vegetables and decorated with an ornamental plant and such a garden is terrace garden. Rooftop gardens referred as living roofs or green roofs. Their impacts are positively correlated with the environment. They have number of benefits such as utilizing space productively, conversion of CO_2 into oxygen and improves air quality index, reduces the temperature of the buildings and energy costs and beautify the environment [2].

Multifaceted benefits associated with the implementation of Rooftop gardens in the city of Bologna explore the production capacity of rooftop gardens (RTGs) in urban agriculture [3]. Terrace garden or roof top garden is the new trend of constructed ecosystems. This urban green infrastructure aims to achieve diverse goals of sustainability through intensive vegetable production [4]. Urban dwellers have interest and desire to cultivate fresh and pesticide free edibles on one's own roof tops [5]. Vegetables are the source of vitamins, minerals and other anti-oxidants etc. so among horticulture crops they are called as "protective food". In the cities there is no space for backyards. Most of the buildings are multi storey. Due to shortage of space for the cultivation of house hold vegetables, available space on roof tops, balconies, corridors, terraces etc. can also be used for vegetable production in multi-storeyed buildings [6].

Urbanization leads to the depletion of natural resources and the loss of forest/garden area. In urban areas all the open spaces are eaten away by concrete buildings because of population explosion. So, the condition of ecological imbalance is created which can cause severe harm to our future generations. To minimize the ecological imbalance, plantations and gardens in open available spaces are necessary. People are benefitted by terrace gardens in various aspects. They are waste recycling, ecological benefits, energy conservation, water conservation, decorative enhancement of buildings, occupant's health benefits and attracting birds and insects [7].

In the multi-storey buildings the un-built space occupied by vehicles. Organic terrace garden is the best choice for city people to grow their own vegetables and foods. So, the main aim of the project is to create awareness through the establishment of organic terrace garden. This is the best solution for urban and peri-urban people to grow their own food. Gardening has a therapeutic value in handling the stress. For various disorders nature is a great healer.

Materials and Methods:

Size of the terrace garden is 22'x27'x8'. GI pipes and green net were used for the construction of green house. The terrace was checked for waterproofing. Garden green shade net protects the plants from excessive heat and rain. The ground surface was covered with thick tarpaulin sheet for waterproofing. Different sizes of grow bags 12x12, 18x6, 18x18, were used for the cultivation of fruits and vegetables. The grow bags have a small opening at the bottom to release the extra water.

Soil:

Coir pith and soil substrate were purchased from nursery. They were mixed in different combination and used for the cultivation of vegetables, fruits, trees and medicinal plants. The potting mix should contain all the basic nutrients. There is no ideal combination for potting mix. They were prepared in different combinations and recommended for organic terrace garden.

Seed sowing and transplanting:

A good quality seeds have chosen for the cultivation of vegetables. Seeds were purchased from Tamil Nadu Agricultural University, Coimbatore. Some vegetable seeds were purchased from organic shops. Seedlings were used for fruit cultivation. After the preparation of potting mix, the seeds can be sowed directly in the grow bags. Some vegetable seeds planted in the seedling tray, then transfer to the grow bags as seedlings. The seedling tray was also filled with potting mix for seed germination. They sprinkled with water. The seedling may be 3 to 4 inches height, then transferred to the grow bags. Some of them planted as seedlings. The transplantation of seedlings has done in the evening times. The seedlings removed from tray along with the seeds. Drip irrigation was used for irrigating the plants in organic terrace garden.

Organic manures and fertilizers:

The growing plants fertilized with organic manures and fertilizers. Farm Yard Manure, vermicompost, panchagavya, NPK consortium were used at regular intervals. Ants, mealy bugs and aphids were common in organic terrace garden. They have controlled organically like neem oil etc.

Tools for organic terrace garden:

The tools pressure sprayer, garden scissor, kothu, sikketcher, korai arms, savaal are the gardener's weapon. The right tools are used for pampering the soil. Garden shears or garden scissors are used for pruning purpose.

Results and Discussion:

Table 1. Vegetables cultivated in terrace garden

S.No.	Binomial Name	Family	Habit
1.	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae	Climber
2.	<i>Lagenaria siceraria</i>	Cucurbitaceae	Herb
3.	<i>Lablab purpureus</i>	Fabaceae	Herb and shrub
4.	<i>Phaseolus vulgaris</i>	Fabaceae	Herb
5.	<i>Vicia faba</i>	Fabaceae	Herb
6.	<i>Vigna unguiculata</i>	Fabaceae	Herb
7.	<i>Momordica charantia</i>	Cucurbitaceae	Herb
8.	<i>Trichosanthes cucumerina</i>	Cucurbitaceae	Creeper
9.	<i>Cucurbita pepo</i>	Cucurbitaceae	Climber
10.	<i>Cucurbita moschata</i>	Cucurbitaceae	Climber
11.	<i>Capsicum frutescens</i>	Solanaceae	Herb or shrub
12.	<i>Capsicum annum</i>	Solanaceae	shrub
13.	<i>Abelmoschus esculentus</i>	Malvaceae	Herb
14.	<i>Cyamopsis tetragonoloba</i>	Fabaceae	Herb
15.	<i>Raphanus sativus</i>	Brassicaceae	Herb
16.	<i>Solanum melongena</i>	Solanaceae	Shrub
17.	<i>Beta vulgaris</i>	Amaranthaceae	Herb
18.	<i>Brassica oleracea</i> var. botrytis	Brassicaceae	Herb
19.	<i>Brassica rapa</i>	Brassicaceae	Herb
20.	<i>Daucus carota</i>	Apiaceae	Herb
21.	<i>Cucumis sativus</i>	Cucurbitaceae	Creeper
22.	<i>Brassica oleracea</i>	Brassicaceae	Herb

Table 2. Fruits cultivated in terrace garden

S.No.	Binomial Name	Family	Habit
1.	<i>Citrullus lanatus</i>	Cucurbitaceae	Herb
2.	<i>Solanum lycopersicum</i>	Solanaceae	Herb
3.	<i>Psidium guajava</i>	Myrtaceae	Tree
4.	<i>Manikara zapota</i>	Sapotaceae	Tree
5.	<i>Carica papaya</i>	Caricaceae	Herb

Table 3. Medicinal Plants cultivated in terrace garden

S.No.	Binomial Name	Family	Habit
1.	<i>Piper betle</i>	Piperaceae	Creeper
2.	<i>Solanum procumbens</i>	Solanaceae	Herb
3.	<i>Andrographis paniculate</i>	Acanthaceae	Herb
4.	<i>Ocimum basilicum</i>	Lamiaceae	Herb

5.	Ocimum sanctum	Lamiaceae	Subshrub
6.	Ocimumtenuiflorum	Lamiaceae	Herb
7.	Phyllanthus niruri	Phyllanthaceae	Herb
8.	Coleus amboinicus	Lamiaceae	Herb

Table 4. Greens cultivated in terrace garden

S.No.	Binomial Name	Family	Habit
1.	Amaranthus tricolor	Amaranthaceae	Herb
2.	Spinacea oleracea	Amaranthaceae	Herb
3.	Amaranthus viridis	Amaranthaceae	Herb
4.	Mentha arvensis	Lamiaceae	Herb
5.	Solanum nigrum	Solanaceae	Herb
6.	Trigonella foenum	Fabaceae	Herb
7.	Coriandrum sativum	Apiaceae	Herb
8.	Hibiscus cannabinus	Malvaceae	Herb
9.	Amaranthus dubius	Amaranthaceae	Herb



Fig. 1. Vegetables cultivated in terrace garden



Fig. 2. Ornamental plants

Terrace garden was sophisticated with water proofing and drip irrigation [8]. The growth of the vegetables and other plants in the terrace garden were monitored every day from the seed sowing to harvest stage. Some of the vegetables were infected with some fungal pathogens. The mixture of baking soda, water and vegetable oil reduced the infections in plants. One part of milk added with nine parts of water was also gave a very good result. Temperature in the terrace garden was decreased due to the presence of plants. It reduced the heat-island effect and provided the cooling impact in the building environment. [9,10,11]. The yield for every vegetable was around one kg. Ornamental plants were used for beautify the environment along with terrace garden.

Conclusion:

The study stated that, establishment of terrace garden is a sustainable way of approach for people in urban areas for gardening. Different combination of potting mixture or medium improves the growth of the vegetables. It improves the various garden skills in students. Terrace garden enhances the beauty of the environment and appropriate climate in the building. Every student has their own ideas in the establishment of organic terrace garden. It is the best choice for young entrepreneurs in the gardening field.

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