Roof Top Gardening for Green Buildings - A Compulsory Need in Present Day

[1]Akula Komuraiah, [2]Kandukuri Shanker, [3]A.N.S .Prasad

[1]Associate Professor, [2]Principal, [3]Associate Professor
[1]Department of Mechanical Engineering,
[1]Kamala Institute ofTechnology &Science, Singapur, Karimnagar, Telangana
[1]akulako@gmail.com

Abstract: **The urban communities are facing the problem of pollution in towns. The atmosphere is much heated with the sunshine. The presence of CO_2 , CO , the pollution gases from industries, vehicles is also a reason for heating atmosphere. In urban areas the cultivation area i.e. "green area "is decreasing and concrete area is increasing. The CO_2, generated by various sources is not converted to oxygen by plants with photo synthesis process. The buildings get heated by direct sunlight on roofs. The cooling machines, equipment's, accessories evolving chloro floro carbons which are much dangerous to human health. To avoid the dangers of heat and pollution the buildings should be cooled with natural processes like the designing eco friendly buildings to grow some plants on its roof . Such roof cultivation is called rooftop cultivation. This roof top cultivation is passive, eco friendly. It conserves the energy and water, improves air and water quality, absorbs solar radiation, little amount of food can also be grown, the beauty of building can also be an aesthetic.**
The basic design in rooftop gardening includes a water proof membrane, a root barrier, a drainage system, filter cloth. The main advantage of the rooftop gardening is that, this building will have a long life when compared to the ordinary roofing. In this paper a model rooftop gardening procedures, plantations, photosynthesis effect, design calculations, the production of agriculture products are discussed.

Key words: Green building, rooftop gardening, solar radiation, eco building, photosynthesis

I. INTRODUCTION:

The roof top gardens have a long history. The ancient ziggurats of Mesopotamia, built roof top gardens between 4,000 and 600 B.C, the hanging gardens of Babylon are probably an examples of roof top gardening. Pope Pius II in Pienza Italy in 1463first designed a roof top garden. The Madison Square Garden was made in US in 1890 [turfmagazine].

Urban areas are famous for luxurious living styles as one side of a coin as other side urban areas are endowed with a lot of indigenous problems such as being crowded with people , lack of greenery , pollution, unhealthy living condition , sewage ill treatment , limited gas and electric supply. The food in cities and towns are becoming costly. The quality of food is also low and not hygienic.

The people in towns, cities now prefers the rooftop gardening to feel happy to conserve energy, water, land, air.

The green roof installations have wide range of advantages over the traditional roofs. Green roofs add value to the structure. The thickness of roof top layer for gardening may be in between 100 to 500 mm [IGBC], the comparison of conventional and green roof is given in table 1.1.

Table: 1.1. Comparison of Green roof and Conventional roof

Benefit	Green roof	Conventional roof
Rain water retention	10-35 % during wet season , 65-100 % during dry season	no
Air quality	Filters air and increases evapotranspiration	no
Energy conservation	Insulates the building	Insulates with additional coatings of insulation.
Habitat	Birds , insects etc	no
Other advantages	Buffers noise, alternative aesthetic, offers passive recreation	no

II. DEFINITION OF GREEN BUILDING AND GREEN ROOF :

Green building

A green building is defined as one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier space for occupants. Compared to conventional building, designed, constructed and operated to minimize total environmental impacts [Sustainable construction]. Buildings are consuming 3% of energy, 25% of water, and 40% of resources and generate 40% waste and 35% greenhouse gases (GHG) emissions.

Green roof

Defining Green Roofs Green roofing is the practice of installing vegetative roof surfaces in lieu of conventional roofing materials such as asphalt or tar. These are engineered roof systems that include vegetation planted in a growing medium above an underlying synthetic waterproof membrane [Matthew Ryan Hodges]

Green roof system components

[1] Roof Deck, Insulation, waterproofing
[2] The first platform which insulates the building from water penetration, the water for plants should not go into the roof.
[3] Protection Layer – root barrier , This layer prevents the root to enter the roof
[4] Drainage Layer - The excess water goes out of the building, but do not enter the roof
[5] Root permeable filter layer - This is layer to allow the root to extend its growth
[6] Growing Media - This layer prevents the fine soil to wash away
[7] Vegetation, Plants - The aim of the roof top gardening is to grow the plant

III. ADVANTAGES OF ROOF TOP GARDENING :

In the past three decades the urban people realized the importance of roof top gardening. There are many advantages basically ecological and economical. It benefits the urban environment and its inhabitants [The Hindu /article10351730].

[1] It enhances the worth of the building
[2] It absorbs the rain water to some extent
[3] Birds, insects lives in this system and bio diversity is conserved.
[4] It improves the life f the building.
[5] It shields from entering the ultra violet (UV) rays of sun.
[6] It absorbs the solar radiation, the temperature of the building is drastically reduces.
[7] Main benefit is that, the potential for building energy savings. A green roof can reduce annual heating and cooling loads [H.F. Castleton]
[8] It improves the aesthetics of the building
[9] The people can enjoy the celebrating the festivals in green vegetation.
[10] The food production, the leaf production, the flower production will increase with good quality
[11] It acts like sound absorption.
[12] It creates a healthy work environment.

IV. RESULTS

Now a days some governments making the roof top gardens compulsory on the buildings. The rooftop gardening is becoming as a strategy to minimize the negative environmental effects of building on ecosystem.

V. CONCLUSION

There is huge loss of habitats in modern days, it can be minimized with the roof top buildings. It increase the economic standards of the owner by producing food, it helps society by proving clean air, and it enhances the aesthetic valve. The life span of the people can increase, because they inhale fresh air.

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