

Green Roofs for Healthy Living in Cities: A New Normal since Covid-19

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Abstract. The concept of green roofs is not new, it has developed long time back, but it has never been spoken largely until the sudden manifestation of a pandemic that struck nations worldwide. The pandemic has made urban residents to realize the importance of converting their grey to green roofs. The benefits of green roofs is manifold in nature as they not only add to aesthetically pleasing landscape but rather absorb rainwater, keeps the building warm, minimize air pollution, decrease stress of the people, improved human health and air quality. People now realize that green roof is the need of the hour because it promotes healthy living in cities in terms of nutritious food consumption, better air quality, and provide sense of mental peace and an agent of destressing busy life of the urban dwellers. Cities have been gradually been a better place since pandemic due to people's choice to opt for gardening due to lockdown. So, in order to kill boredom, the urban residents opted gardening like vegetables, trees, and flowers on their grey roofs which in turn contributed to healthy cities. Thus, this paper will accentuate the significance of green roofs which in turn betters urban environment that have contributed for healthy living in cities.

Index Terms: green roof, urban healthy, living, cities, landscape, buildings

I. INTRODUCTION

In the 21st century, the world has witnessed a rapid economic growth which has led to an increased urbanization and in turn have put pressure on urban land use and standard of living. The present urban scenario often displays bigger picture of induced urban population looking for job opportunities, sprawling of new urban development etc are being made at the cost of green space which resulted in the dearth of greenery and causes a decrease in canopy cover within the urban area leading to an abnormal change in temperature and decreased air quality. The multi-faceted problems of the urban setting in terms of green area scarcity can only be reverted again by turning grey roofs into green roofs. The introduction of growing plants on the unutilized grey rooftop surfaces is the only way out for urban dwellers for sustainable living.

What is green roof? It is planting vegetation on rooftops. In order to promote the growth of various forms of vegetation (vegetables, trees, flowers) on top of residential or commercial buildings and thereby offers an aesthetical as well as environmental and economic benefits.

The COVID-19 pandemic has brought in countless deal of ambiguity to almost all aspects of human life. Since early 2020, people cannot leave their homes, they had to stay indoors and their homes became all-in all to them. It is now their work place, their children's school and playground, spending their past time, leisure, and everything pertaining to everyday life which then forced them to create a self-sufficient space. A thorough

scrutiny through the lens of the pandemic is, therefore, very important. The quest is therefore, developing the self-sufficient environs has become the key point in the analysis of a normal norm in enhancing quality (in terms of food supply, air quality, clean and natural spaces) for building strong immune system,

II. EASE OF USE

2.1 Opting Green Roofs

In the wake of Covid-19 since early 2020, the world has witnessed a drastic change and a fast transformation of urban grey roofs into green roofs due to the fact that most of the food supplies in urban areas depended heavily from other neighboring states or countries. With the declaration of long lockdowns for several months, urban areas were at the receiving end and felt the heat of food supply running out from their local markets and stores. Thus, the urban dwellers came out with the solution to be self-dependent by opting to convert their grey roofs into green roofs or to convert their small compound spaces into kitchen garden immediately.

2.2 Cost and Maintenance of Green roofs

The initial costs of constructing green roofs and maintenance costs are comparatively low as the need of the hour demands them to enforce the method immediately by availing local materials. The idea of green roofs brought an increase in the consciousness of economic, social and environmental benefits that can be derived from such an initiatives which can be taken up as an interest, hobby or even healthy living.

III. MATERIALS AND METHODS

The paper is purely based on primary information which was put forward during the pandemic times. The crisis at

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that point of time was reverted into a challenges and opportunity by performing a field-based exercise in Shillong, capital city of Meghalaya in North East of India. During early 2020, an urban community for Sustainability was formed urgently with a team of 5 members. Taking stock of the situation, the team gathered thermacol boxes from a local fish market and distributed to urban dwellers randomly. A total of 57 households were given 5 types of vegetable seeds (Carrots, French beans, Lettuce, Arugula/rocket herbs, Tomatoes) and thermacol boxes as shown in Fig:1. All urban recipients were also instructed the ways to grow them and harvesting them.



Fig:1. Vegetable Seeds and Thermacol Box distributed to urban dwellers

After a period of 8 to 9 months, primary survey has been performed on all the 57 recipients to follow up the success or failure of the trial run system using open ended questionnaire on the time, duration of growing to harvesting time, quantity of the harvest etc.

3.1 Discussion and Results

From the analysis on the gathered information through questionnaire, it is found out that the trial run system proved to be successful. The details are discussed as under:

3.1.1 Time Taken to Sow Seeds

From the table it is seen that out of the total 57 numbers of recipients, 45 (more than 80 percent) of them sow the

distributed seeds in the first month itself, 7 of them (13 percent) sowed on the 2nd month while only 5 of them (5 percent) sowed after 2 months.

Table 1. Time taken by Recipients to sow the distributed seeds

First Month	2 nd month	After 2 months
45	7	5

Field Work, 2020-21

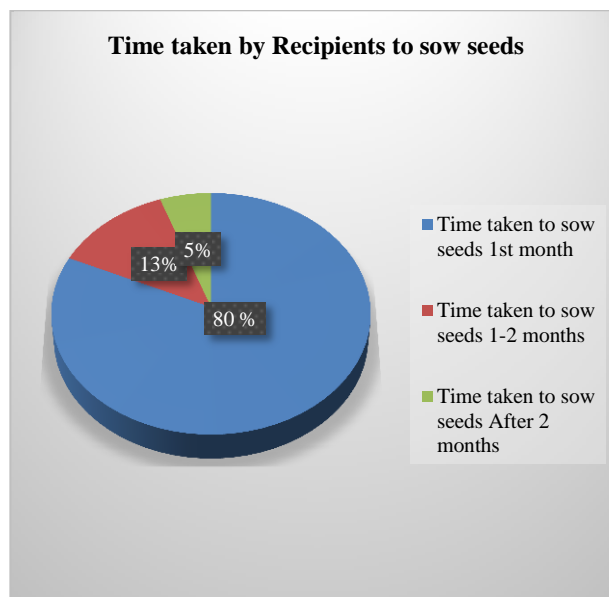


Fig:2- Pie diagram highlighting time taken to sow seeds

From the recipients' response, it is found that most of the people took no time to delay in sowing the distributed seeds, whereas the 13 percent recipients informed that due to preparation of proper place to keep the thermacol, limited availability of soil for planting delayed their sowing and only 5 percent said that as they are engaged in COVID duty they took time to sow the seeds

3.1.2 Duration of growing to harvest time

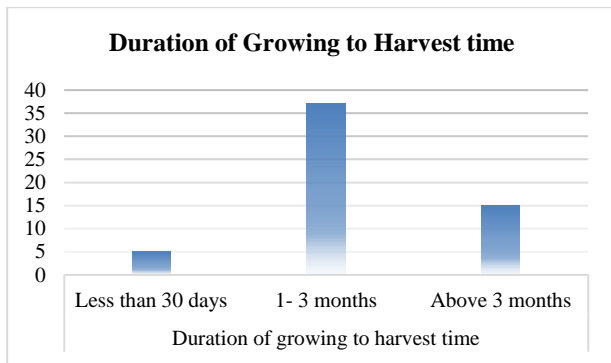
It is observed that about 8.7 percent get to harvest their produce in less than 30 days, whereas 65 percent harvested between 1 to 3 months and about 26.3 percent harvested after 3 months.

Table 2. Duration of growing to harvest time

Less than 30 days	1-3 months	Above 3 months
5 (8.7 percent)	37 (65 percent)	15 (26.3 percent)

Field Work, 2020-21

Note: the number in parenthesis indicates percentage



The factors responsible for variation of percentage is due to the soil type, local climatic conditions, the level of care given to the plants. Those harvesting in less than 30 days have favorable conditions for healthy growth and the vegetables harvested are French Beans, Lettuce, and Arugula herb or better known as Rocket. The category of Above 3 months reported that their area faces acute water shortage therefore, it affects growth.

3.1.3 Quantity of Vegetables Harvested in 2020

When look at quantity of Vegetables harvested, it is found that Lettuce, Arugula herb produce less than 2 kg, tomatoes fall under 2.5 to 3 Kgs and only French Beans and carrots produced above 3 Kgs in a total cycle in 2020.

Table 3- Quantity of Vegetables harvested (in Kgs)

1-2 kg	2-5-3 Kg	Above 3 Kgs
Lettuce, Arugula Herb	Tomatoes	French Beans, Carrots

Field Work 20-21.

It is further observed that all 57 recipients reported that they first harvested green leaves whereby they consumed as salads for meals and also, they were able to share with their relatives and friends. Harvesting is done every 10 to 15 days which is sufficient for a day or two meals, whereas, French beans are harvested after 30 days varying around half kg to 1 kg per harvest, but as for carrots they could harvest around 3 Kgs above and only once when it is fully grown and for tomatoes it varies as per its ripening stage.

3.2 Crises turned into Opportunity

The positive outlook of the project for a common cause by common people without waiting and seeking for any government aid is a wonderful story to share amidst Covid-19 pandemic that took the world by surprise to bombard health, security of mankind. Through these uncertainties of the future, the urban dwellers understood to take this as a challenge to self-determination to be self-reliant in food supply, better environment free of pollution, taking concerted effort to develop whatever space they have in and around their compound or premises to enjoy greeneries, small garden etc.



Converting grey to green roof, November 2020



Converting parking lot into small garden

3.3 The Benefits

The benefits of green roofs are many, it was only after it has been installed that respondent reported that green roof provides aesthetic pleasure to them, healthy work environment and amenity value, satisfied and healthy food production.

IV. CONCLUSION

The change of urban outlook after the Covid -19 pandemic have really been an eye opener to the urban dwellers. The post Covid 19 have brought benefits through green roofs which facilitates other urban residents to take up the challenge of installing green roofs. The numbers of them have increased drastically in early to mid-2021, whereby various vegetables, fruit trees, flowering trees are been planted adding to a more luxuriant variety of vegetation thriving in the city of Shillong.

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