ROOFTOP GARDEN

AND USE OF HYDROGEL IN URBAN AREAS

Vemulapalli Haripriya, Deekshitha Bomireddy,
Mohammed Sharukh Pasha, Srinanda Mondal

INTRODUCTION

Since the the 1980s, they have been extremely prevalent in Europe, such as Germany, Switzerland, the Netherlands, and Belgium, and they have now begun gradually making an appearance into North America and Canada, as people begin to recognize and take advantage of the numerous benefits that green roof infrastructure provides to cities. There are also ordinances in Europe, where governments levy charges on runoff water. As a result, many people choose to green their roofs in order to stay out of these charges. Gardens are essence gardens on a building's rooftop, man-made green spaces on the highest level of commercial and residential buildings. These lush greenery areas, which are made up of various plants, help to improve the aesthetics of a facility. This also helps in meeting the household food needs providing adequate and safe nutrition. They are prevalent from the ancient times for instance the Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World, are sometimes pictured as long buildings filled with greenery, sometimes even enormous trees. Finding cultivable land in cities has been a huge hurdle this could be eliminated by adopting Rooftop urban farming also known as zero-acreage farming. To ensure proper plant performance, while researching green roofs, it is very critical to consider the climate specifications of the region when selecting the growing medium, soil depth, water requirement and other substrate attributes.

ADVANTAGES OF ROOF TOP GARDEN:

- Runoff water is reduced.
- The guarding of the roof structure against physical and thermal degradation (isolation from UV radiation and temperature variations).
- A buffer against heating in the summer and cooling in the winter.
- Noise absorption.
- The establishment of new eco places for the settlement of local flora and animals in the city, as many species are brought in by wind and birds.

SELECTION OF FLORA

A Roof Top Garden's choice of flora is crucial to its optimal growth. Flora should be chosen in accordance with the current climate. Green roofs in temperate climates, in particular, are frequently subjected to periodic drought and rapid fluctuations in moisture availability this is due to the shallow depth and low water content of the substrate. Spearmint (*Mentha spicata* L.) which is commercially grown all over the world, the plant's ground fresh biomass and dried leaves are used as a spice and in herbal drinks. Furthermore, spearmint is usually acknowledged as safe in ordinary diets and can be ingested. Spearmint is glabrous, creeping rhizomatous, and herbaceous perennial plant. This plant usually grows well in sand or clay soil and prefers bright or partly sunny light. However, in Rooftops quick heating from the sun, water availability, high winds, temperature differences are quite common which limits the growth. In order to avoid such hurdles we should opt for flora that suits the climate.

USE OF HYDROGELS IN ROOF TOPS :

Hydrogel polymer is categorizd as a super absorbent polymer. Hydrogel offers answers to the shortage of fresh water for agriculture by increasing soil and water productivity without harming the environment or natural resources. Previous studies have demonstrated that hydrogels can boost plant morphological and physiological traits during drought circumstances and extend plant survival. However the extent of their effectiveness is unknown, and study is ongoing. By utilizing the same property of the hydrogel we could make rooftops profitable and splendid. This is evident from the experiment conducted in south korea.

EFFECT OF HYDROGEL ON PLANT GROWTH

The most crucial stages of every plant's early development are seed germination and seedling establishment, which depend on the availability of water and are frequently impeded by low soil moisture levels, especially in arid and semi-arid areas. This could be delt by using hydrogels. By improving the soil's capacity to store water and extending the time it takes for plants to wilt, hydrogel polymers promote plant growth and increase the survival of plants under water stress, which not only result in increased overall output under varying degrees of severity but also prevents micronutrients from washing into water tables and increases water consumption efficiency; it also reduces fertilizer quantity since nutrient leaching is prevented by limiting runoff.The could be a boon in case of the roof top aswell.

ADVANTAGES OF HYDROGEL:

- Hydrogels function as "miniature water reservoirs" around plant roots. It is capable of absorbing both internally and externally supplied water 400-1500 times its own size then slowly discharge it under water-stress conditions via the root capillary suction mechanism
- It can perform the cyclic process of water absorption and desorption, provide optimum plant-available moisture for quick seed germination and seedling establishment, and boost crop growth and yield
- In cold climates, the usage of hydrogels prevents the moisture retained in the structure from freezing and allows simple access to the plants, regulating seedling growth temperature and preventing death by freezing.
- It assists in helping the plant survive prolonged moisture stress by putting off the onset of permanent wilting
- It may decrease the excessive usage of minerals such as micronutrient fertilizers and pesticides
- It can prevent soil compaction, improve soil aeration, and release soil mineral nutrients.

CONCLUSION:

The article highlights the necessity of rooftop gardens in India's urban regions, considering the country's substantial reliance on agriculture and the environmental consequences of rising urbanization. Rooftop gardens provide numerous advantages, including improved aesthetics, addressing food demands, and mitigating climate change by lowering temperatures. In arid and semi-arid conditions, hydrogel, a super absorbent polymer, is offered as an ideal solution for rooftop gardens to meet plant water requirements and boost plant development. Overall, combining rooftop gardening and hydrogels has the potential to increase agricultural productivity, promote sustainable urban development, and address environmental issues in India.