

VERTICAL FARMING

[Article ID: SIMM0240]

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INTRODUCTION

Vertical farming is the practice of growing crops in vertically stacked layers. Vertical farming has been proposed as an engineering solution to increase productivity per unit area by extending plant cultivation into the vertical dimension, thus enhancing land use efficiency for crop production (Eigen brod and Gruda 2014). In Vertical Farming system crops are planted in vertically managed layers so as to harness the unaccustomed vertical area which is otherwise left unconsidered in almost every cultivation practices.

It is estimated that there is approximately 800 million hectares of land that is designated to soil-based farming globally, which constitutes about 38% of the total global land area. Moreover, about 80% of the total arable land is currently being utilized across the globe (Ellingsen & Despommier, 2008). The whole world is on the verge of population explosion and it is a challenge to feed this ever-increasing population (Sonawane, 2018). Some urban planners and agricultural leaders have argued that cities will need to produce food internally to manage the ratio of demand and

supply to avoid falling food prices, harmful pollution and inflation (Kodmany, 2018).

Vertical gardening/farming systems are not only suitable for small farms, but can also be developed on marginal lands, because plants grown in growth media do not depend on the state of the local area (Nitisapto, 1993). Vertical farming systems can also be applied to multilevel buildings, public housing or even on settlements in areas. With this method the land can be utilized optimally and more efficiently. Furthermore, it is said that a vertical farming system is able to double crop yields up to 3-4 fold when compared with conventional systems, i.e., directly planted in the ground (Widarto, 1994; Sutarminingsih, 2003).

Why Vertical Farming?

Vertical farming has numerous of benefits. Some of the major and crucial advantages of the vertical farming are as listed below:

- It increases yield per unit area i.e., productivity even from a small piece of land.
- It Increases the amount of net return to the farmer.
- It helps in best utilization of the vertical area which is generally left unused.
- It provides fresh vegetables to the consumers.

Present Status of Vertical Farming in India:

India is one of the strongest economies in the world. It is the hub of variety of cultivated species of plant. The majority of population of India is dependent upon farming for their livelihood. So, it is necessary to develop, explore and adapt new techniques to increase food resources with this continuously increasing urbanization (Bhangaonkar et al, 2017). Vertical farming is one such solution. The vertical farming

can be carried out in a small structure to large sky scrapers. Vertical farming involves growing of crops vertically in controlled atmosphere using technology like LED lighting, heating, ventilation and air-conditioning (HVAC) systems, to maintain total control over the environment (Sonawane MS, 2018).

Vegetable Crops Suitable to Grow in Vertical Farming:

The vertical farming enables the harvesting of the crops earlier than the open environment condition (Stapleton and Hochmuth, 2001). As it enhances the productivity, so it is best for the cultivation of those crops in which the leafy part is useful and these crops are none other than salad crops which are mostly vegetables. Leafy greens like Lettuce, Spinach, Parsley, Swiss chard, Chinese cabbage etc. are suitable for cultivation under vertical farming.

References:

- Eigenbrod C & N Gruda. 2014. Urban vegetable for food security in cities. A review. *Agronomy Sustainable Development*; 35:483–498.
- Ellingsen E & Despommier D. 2008. The Vertical Farm-The origin of a 21st century Architectural Typology. *Council on Tall Buildings and Urban Habitat Journal*; 3:26–34.
- Bhangaonkar AB, Joshi MP & Huseni SS. 2017. Exploring economical & environmental benefits of vertical farming using multistory panels. *International Journal of Advance Engineering and Research Development*.

Kodmany Kheir. 2018. The Vertical Farm: A Review of Developments and

Implications for the Vertical City;8(2):24.

- Nitisapto M. 1993. Vegetables cropping with Vertical Agriculture. Faculty of Agriculture, Universitas Gadjadara Yogyakarta. (In Indonesian).
- Sonawane MS. 2018. Status of Vertical Farming in India. *International Archive of Applied Sciences and Technology*;9(4):122-125.
- Sutarminingsih L. 2003. Pola Bertanam Secara Vertikal. Kanisius. Yogyakarta
- Widarto L 1994. Bercocok Tanam Secara Bertingkat (Vertikultur). Penebar Swadaya. Jakarta.



(Vertical farming)



(Vertical farming in Lettuce)



(Hydroponic unit at KVK, Solan)