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Popular Article

Walls Feeding Millions: Rising to New heights

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Introduction

Addressing global food needs is a critical challenge, with vertical farming emerging as a sustainable solution. This approach, leveraging advanced technology and intensive agricultural methods, has the potential to significantly increase crop yields. However, challenges such as water scarcity, climate change impacts, labor shortages, and reduced arable land due to urbanization must be addressed. Despite challenges, vertical farming presents opportunities to enhance sustainability by restructuring for increased efficiency. This method is particularly advantageous in regions with restricted access to fresh produce, as it can stimulate local economies, create jobs, and guarantee nutritional security. These advantages underscore the potential of vertical farming as a viable solution in agriculture.

As the global population expands, urbanizes, adopts modern technologies, and faces rapid environmental changes, addressing hunger, and poverty, and ensuring sustainable agricultural and food systems has become one of the foremost challenges of our era (Kamal, 2017). In the 1980s, Swedish ecological farmer Ake Olsson developed a spiral-shaped rail system for plant cultivation and proposed vertical farming as a solution for urban vegetable production, revolutionizing traditional farming methods in cities (Rameshkumar et al. 2020).

Conversely, optimal utilization of vertical space leads to increased productivity. To illustrate, one acre of indoor vertical farming space can match the output of four to six acres of traditional outdoor farming (Ciceklia and Barlas, 2014).

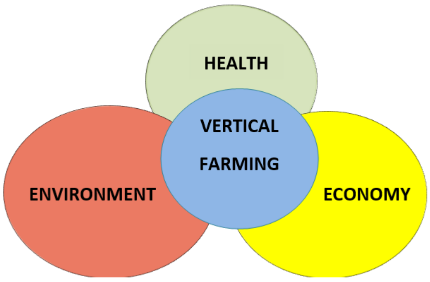

Figure 1 : Vertical Farming interlinked with health, environment & economy

Need for Vertical Farming:

The encroaching boundaries of suburban evolution are consuming an increasing amount of farmland. On the other hand, the lack of available land and high expenses have already caused trouble for urban farming. We desperately need game-changing answers to this massive worldwide issue (Muller et al., 2017). Indoor farming can give potential yields and provide a long-term source of remuneration because it can be done year-round regardless of the weather (Katz and Bradley, 2013).

Vertical farming not only boosts yield but also reduces costs associated with transportation and storage, resulting in significant economic advantages (Van Gerrewey et al., 2022). For example, vertical farms in urban areas could be strategically located so that produce can be sold directly to the consumer, lowering costs by 60% (Al-Kodmany, 2016).

Figure 2 : Plants grown on wall of building

Figure 3 : Shifting towards self sufficiency

Future Prospects

Vertical agriculture represents an evolution from traditional methods, moving beyond soil-based farming and single-level crop growth. It embraces soilless cultivation and multi-level vertical growth within controlled indoor settings like glasshouses or buildings. This approach ensures year-round production of fresh, safe, and nutritious food, enhancing crop yield and profitability while mitigating the risk of soil-related diseases (Treftz & Omaye, 2016). Vertical farming achieves equivalent production levels using only 5%-10% of the space required by traditional agriculture, showcasing its space-efficient nature (Benke & Tomkins, 2017).

The adoption of vertical farming has appealed to a tech-savvy younger generation, leading to the emergence of a new type of farmer. This method offers various benefits, such as fostering the creation of innovative agricultural technologies. Additionally, urban residents may rediscover a connection with nature through participation in farming activities (Al-Kodmany, 2016).

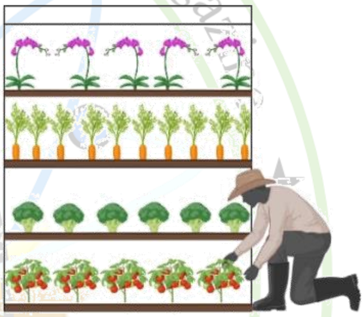

Figure 4: Care and maintenance

Figure 5: Controlled use of pesticide

Conclusion

The conflict between agricultural and urban lands intensifies under globalization, as global food demand rises while farming areas diminish. Vertical farming, an innovative sustainable urban agriculture approach, addresses these challenges effectively. It utilizes a mere 30%-50% of the water compared to traditional agriculture, conserving valuable resources. This method yields sterile, non-polluting crops and even purifies gray water during production, minimizing environmental impact. With yields 20-50 times higher than traditional methods, vertical farming ensures superior quality due to controlled environments and uniform production standards.

One of its key advantages is a year-round operation, eliminating seasonal constraints like ploughing and weeding, thus ensuring consistent production and reduced labor needs. Furthermore, vertical farming proves energy-efficient and eco-friendly, especially when paired with renewable energy technologies. This combination reduces pollution and conserves resources, contributing significantly to sustainability efforts. In essence, vertical farming emerges as a pivotal solution amidst the agricultural-urban conflict, offering a sustainable path to meet growing food demands while mitigating environmental challenges under globalization.

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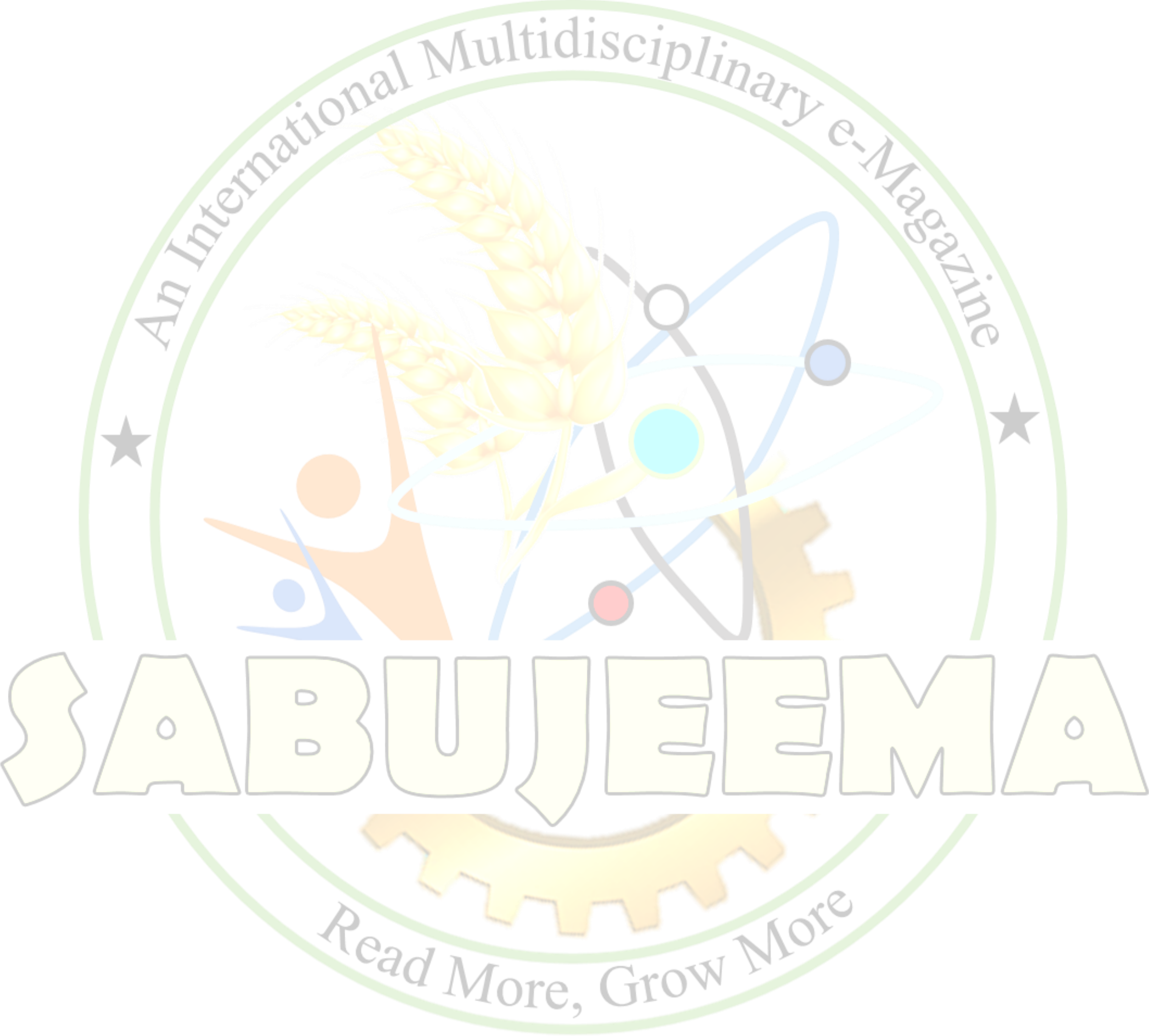
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