

MAKING OF VERTICAL FARM (MODEL)

Equipment's used

Angles, iron pipe, PVC pipes, wall, plastic tubs, soil, manure, rotating tyers, paint.

Tools used:

Hammer, chipping hammer, tong, welding machine, drilling machine, grinding machine, file

Procedure:

- At first, we design the structure for the vertical farm.
- Then drill holes in tub.
- Mix manure and soil.
- Fill tubs with mixture of manure and soil.
- Then we divide this mixture into 3rows.
- Then we sprinkle seeds into soil 1 inch deep, it takes almost 2 weeks to grownup.
- Plumbing work.
- Then we test it with water.

Precautions:

- Proper sunlight, air and water.
- Care from birds (they eat seeds)
- Handle tubs with care.



CHALLENGES IN AUTOMATION FOR VERTICAL FARMING SYSTEMS

- Making return on investment attractive
- System optimization by proper integration of Automation, Plant Culture, and Environment
- Balancing fixed automation and flexible automation (i.e. Identifying appropriate level of necessary machine intelligence)
- Multiple use of machine or parts of machine.
- Limited market demand and acceptance Concern for safety in operation
- Continuous improvement of research and development capabilities.

IMAGES OF COMMONLY PRACTICED STRUCTURES





What Are the Pros and Cons of Vertical Farms?

- **Continuous Crop Production:** Vertical farming technology can ensure crop production year-round in non-tropical regions. And the production is much more efficient than land-based farming. According to Despommier, a single indoor acre of a vertical farm may produce yield equivalent to more than 30 acres of farmland, when the number of crops produced per season is taken into account.
- **Elimination of Herbicides and Pesticides:** The controlled growing conditions in a vertical farm allow a reduction or total abandonment of the use of chemical pesticides. Some vertical farming operations use ladybugs and other biological controls when needed to deal with any infestations.
- **Protection from Weather-Related Variations in Crop Production:** Because crops in a vertical farm are grown under a controlled environment, they are safe from extreme weather occurrences such as droughts, hail, and floods.
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- **People Friendly:** Conventional farming is one of the most hazardous occupations in the United States. Some common occupational hazards that are avoided in vertical farming are accidents in operating large and dangerous farming equipment and exposure to poisonous chemicals.

In spite of these perceived advantages of vertical farms, some agricultural experts are skeptical that the costs and benefits will pencil out. Some think that expensive urban real estate in many cities may rule out vertical farms (although using abandoned warehouses or environmentally contaminated sites may help the economics). And the high electricity usage to run lighting and heating/cooling in a vertical farm impacts the economics

- **Land and Building Costs:** Urban locations for vertical farms can be quite expensive. Some existing vertical farms are based in abandoned warehouses, derelict areas, or Superfund sites, which can be more economical for construction.
- **Energy Use:** Although transportation costs may be significantly less than in conventional agriculture, the energy consumption for artificial lighting and climate control in a vertical farm can add significantly to operations costs.
- **Controversy over USDA Organic Certification:** It is unclear if or when there will be agreement on whether crops produced in a vertical farm can be certified organic. Many agricultural specialists feel that a certified

organic crop involves an entire soil ecosystem and natural system, not just the lack of pesticides and herbicides.

- **Limited Number of Crop Species:** The current model for crops grown in vertical farms focuses on high-value, rapid-growing, small-footprint, and quick-turnover crops, such as lettuce, basil, and other salad items. Slower-growing vegetables, as well as grains, aren't as profitable in a commercial vertical farming system.
- **Pollination Needs:** Crops requiring insect pollination are at a disadvantage in a vertical farm, since insects are usually excluded from the growing environment. Plants requiring pollination may need to be pollinated by hand, requiring staff time and labour.