Urban Agriculture – Water Efficient Food Production

Dr. Tina Jaskolski
Cairo 2050

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
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<tbody>
<tr>
<td>2006</td>
<td>16 million inhabitant</td>
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<tr>
<td>2020</td>
<td>20 million inhabitant</td>
</tr>
<tr>
<td>2050</td>
<td>30 million inhabitant</td>
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</tbody>
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The region accommodates: 22% of total population of Egypt
: 43% of total urban population of Egypt
Urbanization and Urban Expansion

Source: World Cultures
EGYPT: Post harvest losses of up to 50% in transportation, CO2 emissions
Aerial View – Informal Area

Source: GIZ.
Access to Green Space

- Cairo informal areas
- Densely packed neighborhoods
- Concrete dominates
- Open and green spaces are rare
Urbanization Delta

Source: Diercke International Atlas.
Building rooftop farms in Egypt

- Neglected
- Used as dumpsites
- Hubs for rodents and pet houses
- Residential areas for the underprivileged
- Filled with satellite dishes and small wooden structures
- Planted (in a few cases)
Rooftop Gardening

“Simply refers to growing of plants on the roof of a building”

Cairo Governor 2019: All of Cairo’s rooftops should be green in order to reach Egypt 2030

Objective: "To foster sustainable utilization of neglected rooftop space especially in urban areas to increase food security while saving on the precious non-renewable resources.”
Benefits of green roofs

<table>
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<tr>
<th>Economic Prosperity</th>
<th>Social Responsibility</th>
<th>Environmental Protection</th>
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<tbody>
<tr>
<td>- Increase local food production</td>
<td>- Health</td>
<td>- Improve air quality</td>
</tr>
<tr>
<td>- Income from organic products</td>
<td>- Aesthetic value</td>
<td>- Increase biodiversity</td>
</tr>
<tr>
<td>- Increase in property value</td>
<td>- Exercise &amp; recreation</td>
<td>- Reduce heat-island effects</td>
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<tr>
<td>- Reduce building energy costs</td>
<td>- Education &amp; awareness</td>
<td>- Reduction in waste</td>
</tr>
<tr>
<td></td>
<td>- Fresh Food</td>
<td>- Hydrological benefits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reduced carbon footprint in foods</td>
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</tbody>
</table>
Plants for rooftop gardening

- lavender
- mint
- basil
- rosemary
- pepper
- green beans
- tomatoes
- lettuce
- cucumber
- carrots
- eggplants

Factors to consider:
- soil depth
- soil type
- season
- purpose
- root design
- water requirements
- costs
- growth habit
Rooftop growing media

1. Organic matter
2. Inorganic matter
3. Air
4. Water

Organic matter

- Peatmoss
- Compost
- Manure
- Straw
- Saw dust
- Worm castings

Inorganic matter

- Perlite
- Scoria
- Expanded clay
- Coarse sand
- Vermiculite
AUC Rooftop Gardening Research Program since 2013

- Potted plants
- Aquaponics system
- Vertical garden
- Herb planters
- Extensive garden
- Raised bed planters
Raised bed planters

- Easy to contain the soil
- Beds that meet the needs of your plants
- Ease of preparing soil mixtures with all desired properties
- Easy to control weeds and pests
- Easy to manage drainage
Vertical garden

- Maximize the limited space
- Increase accessibility
- Produce healthier plants
- Increased productivity
- Create a micro climate
- Improve air quality
Extensive roof gardens

- Low management requirements
- Low water requirements
- Succulents
Aquaponics system

- Fish + plant growth
- Saves water
- Nutrient provision
- Closed loop system
  - No wastage
- Fish production + Food production
- Reduced carbon footprint
Hydroponic systems

- Soil-less plant growth (*plants + Nutrient medium – Soil*)
- Low risk of soil borne diseases/pests
- Production +70%
- Save up to 90% of water
- Pumps (water / food /energy)
Saft El Laban, Zahraa

- Challenges:

  Maintenance, ownership, sharing of produce, fluctuation of personnel (knowledge transfer)
El Amal School for the Deaf
Green Walls

➢ Food production
➢ Insulate and protect walls
➢ Greener, more pleasant spaces
➢ Greywater filtration analysis

➢ Two strategies:
  ○ Pocket design
  ○ Pipe design
Food Producing Green Walls
Conclusion

Green roofs contribute to:

- Saving **water** and making use of each drop of water by using different systems: hydroponics and aquaponics

- **Food** security by producing food for the household or productive/commercial roofs

- Saving **energy** by using small pumps and insulation

- Reduce the temperature of the building

- For widespread upscaling need affordable models that are easy to run and maintain