



Vertical Agriculture

CENE 476: Urban Farmers
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Introduction

- Agricultural cultivation in stacked layers
- Control food supply and food security
- Sustain small to medium size urban family
- Design affordable prototype for patent



Figure 1: Vertical Agriculture [1]

Project Understanding and Background



Figure 2: Future Design [2]

Primary Stakeholders:

1. Client
2. Food/Agriculture Industry
3. Environment
4. Public

Main Components:

1. Watering
2. Lighting
3. Structure

Watering

- Nutrient solution added to water
- Young plants at beginning; older plants near end
- Water recirculated

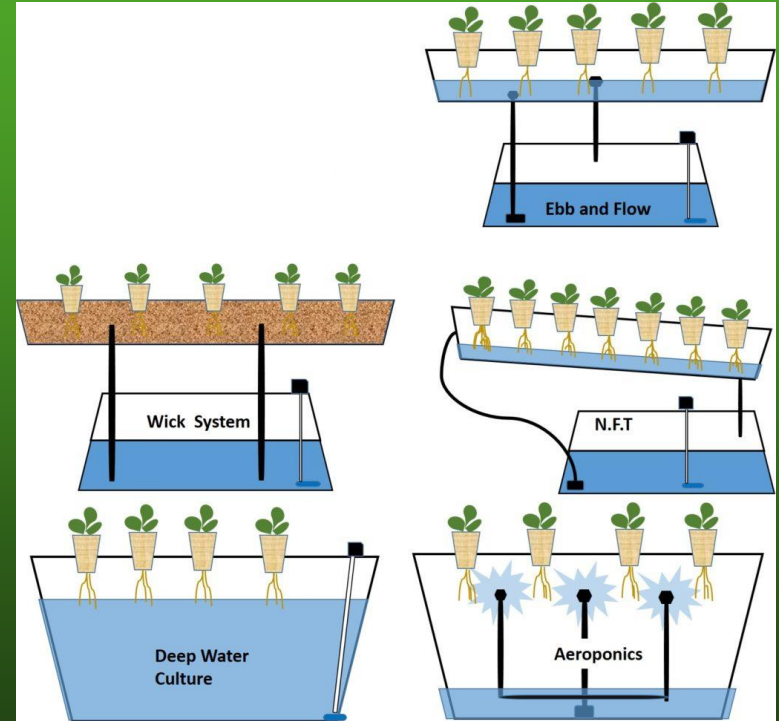


Figure 3: Aquaponic Watering Variations [3]

Lighting

- Light wavelength isolated to meet specific plants needs
- Bulb options:
 - LED
 - Halide
 - Fluorescent
 - CFL
 - Incandescent
- Optimum wattages
- Plant life stages

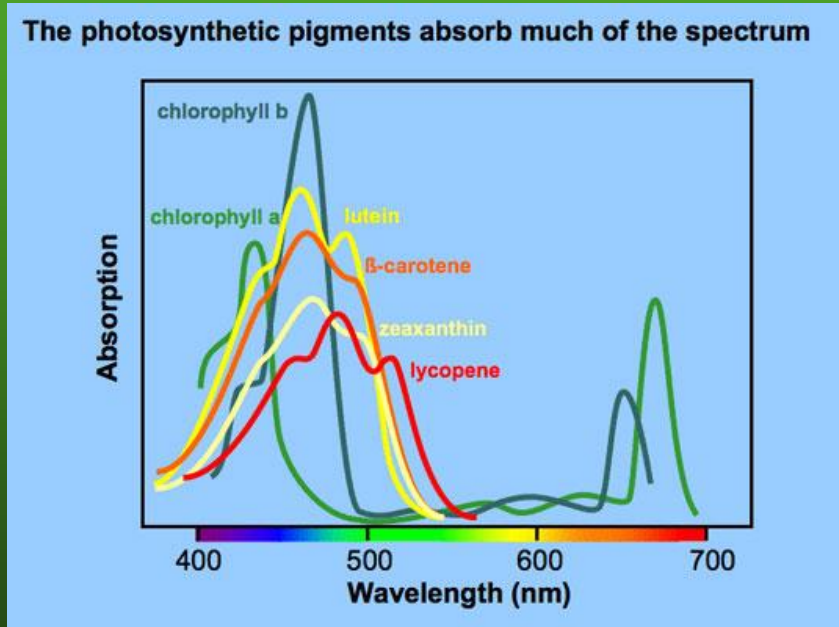


Figure 4: Absorption vs Wavelength Graph [4]

Structure

Examples of Vertical Agriculture Structures:



Figure 5 [5]



Figure 6 [6]



Figure 7 [7]



Figure 8 [8]

Scope of Services

Task 1: Research

- Determine optimal system components

Task 2: Design

- Specify structure dimension, watering demand, and lighting demand



Scope of Services

Task 3: Construction

- Layout, Assembly, Inspection

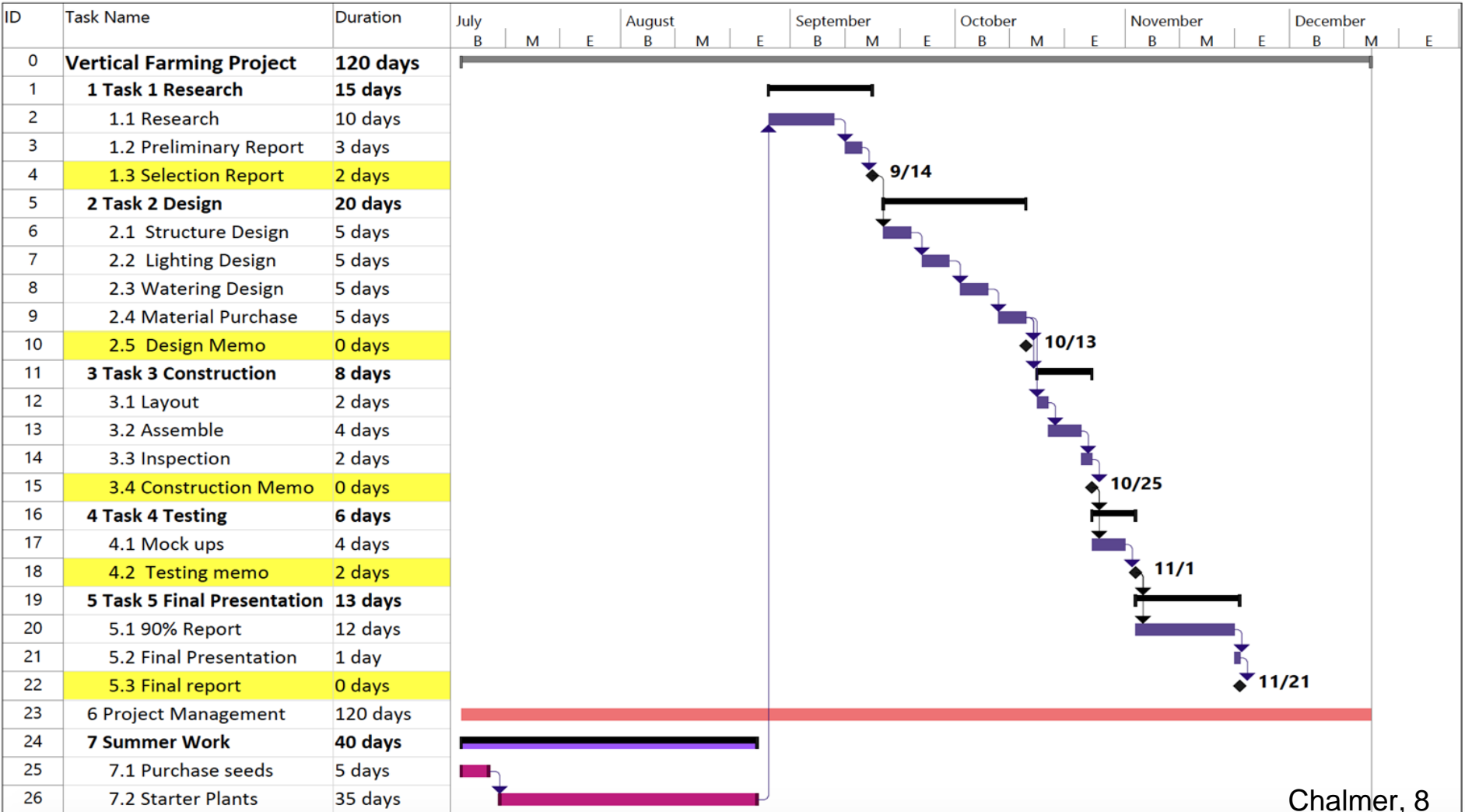
Task 4: Testing

- Evaluate crop yield

Task 5: Final Presentation



Figure 9: Testing [10]



Staffing

Position	Hours	Rate of Pay	Total Cost
Project Manager	<i>140</i>	<i>\$140/hr</i>	<i>\$19,600</i>
Senior Engineer	<i>180</i>	<i>\$130/hr</i>	<i>\$23,400</i>
Engineering Technician #1	<i>240</i>	<i>\$75/hr</i>	<i>\$18,000</i>
Engineering Technician #2	<i>240</i>	<i>\$75/hr</i>	<i>\$18,000</i>
Total	800		\$79,000

Benefits

- Sustainability
- Year-round crop production
- Increase crop yield
- Reduce transportation cost
- Reduce pollution from fertilizers and pesticides



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