AEROPONICS
A Sustainable Alternative to Traditional Agriculture

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Abstract:

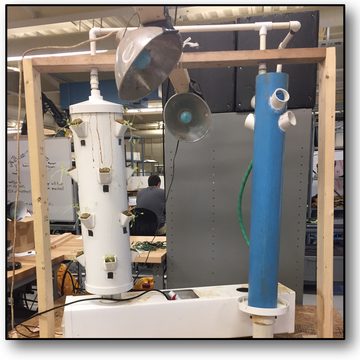
All people should have affordable access to proper nutrition. The Aeroponics team has worked to design a sustainable growing system that allows users to grow nutrient-rich vegetables year-round in arid climates. The project is intended to use space, water, and materials efficiently to reduce waste and cost. Although the final product is inspired by existing aeroponic technology, it uses elements of other aquaponic technologies in order to meet nutrient needs of the plants. In addition to the physical system, the Aeroponics Project explores the process of growing plants in nontraditional mediums with nontraditional nutrient sources.

Goals:

- Total system cost under $500
- Efficient space and water use
- Utilize materials readily available in Burkina Faso
- Support growth of leafy greens and fruit bearing plants year round
- Test nutrient source

Testing:

- Growth and cup trials are shown in the figure below



Conceptual Design:

Full Aeroponic System:

Tower Body Component

A– Tower

B– Trough and cap assembly

Pump and Piping Component

C– Tower end cap

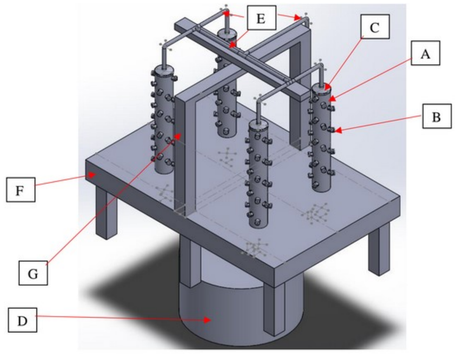
D– Reservoir (contains pump)

E– Assorted piping

Superstructure Component

F– Primary portion of superstructure

G– Secondary portion of superstructure



Prototype:

Superstructure component to support the flow and tower assemblies

- Made from metal, easily manufactured in Burkina
- Houses two towers
- Compatible with a shade curtain

Tower design

- Uses large troughs rotated around the tower
- Houses eighteen plants per tower

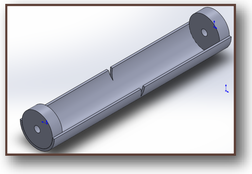
Cup Design:

-Troughs or cups constrain plants and supply them with water

-Troughs go completely through tower

-Cups remain on single side of tower

-Trough design is easier to consistently manufacture



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Thank you!

Our Client:

We are currently working with Open Door Development in Mahadaga, Burkina Faso. Our client contact, Matt Walsh, has supplied us with I nformation and resources to create the best possible community system in Burkina. Our goal is to implement the first iteration of our Aeroponics System in May 2017. We will assemble a trial system and work with the community to make progress towards a completely sustainable alternative growing method.

O.D.D. Open Door Development

Nutrient Testing:

- Plants showed significant bleaching and weak stalks, indicating a nutrient deficiency
- The compost tea mixture was analyzed using a spectroscope for nutrient content
- Field tests will be used to quantify nutrients available in the soil and compost in Burkina Faso
- We hope to refine the compost tea mixture so that a sustainable nutrient source can be used in Burkina Faso

Conclusions:

- The superstructure design for Burkina has been finalized
- Angled cups are not viable due to poor water retention therefore the trough design is the best option
- The nutrient testing procedure used at Messiah College cannot be replicated in Burkina Faso, a modified version of the testing procedure needs to be created to be used in Burkina
- More attention needs to be given to possible additives to the compost tea mixture

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