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## Sustainable Agriculture: Aquaponic Solutions

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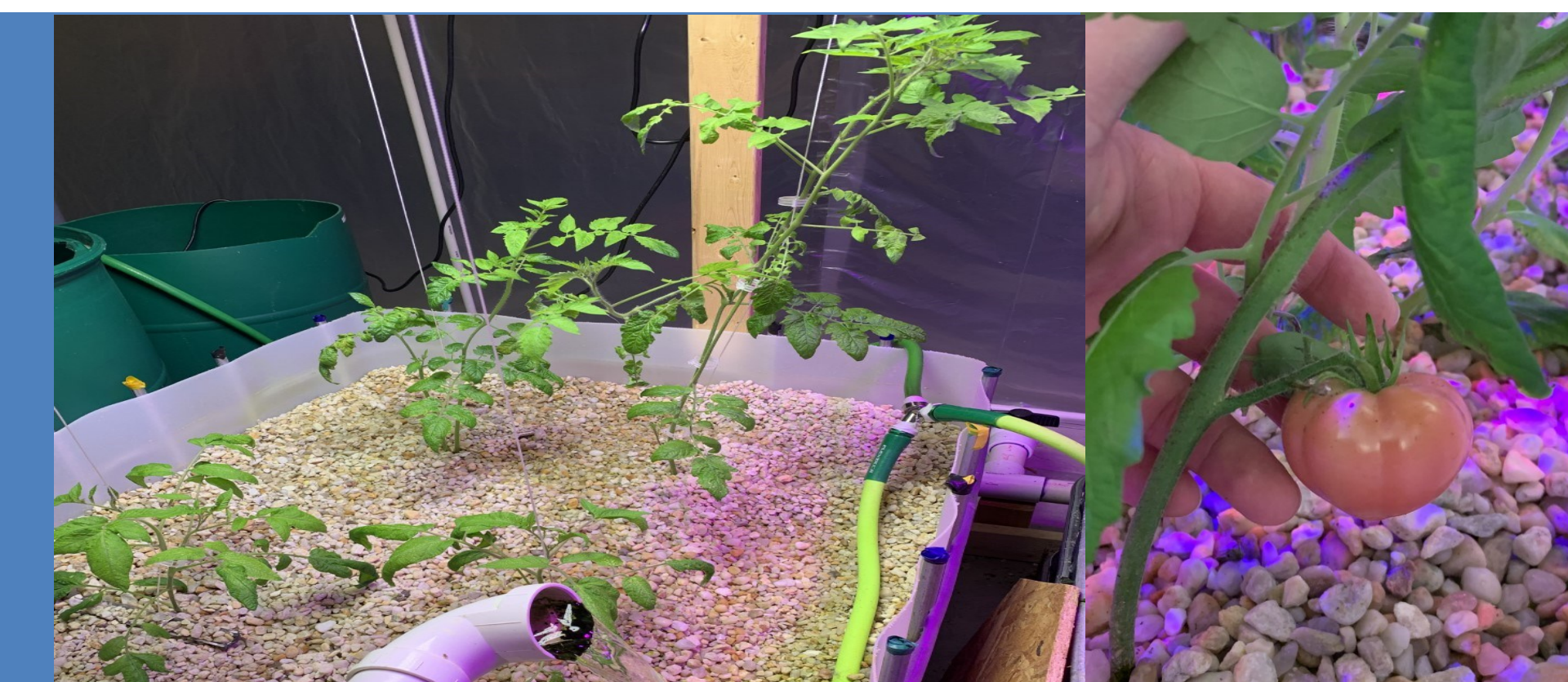
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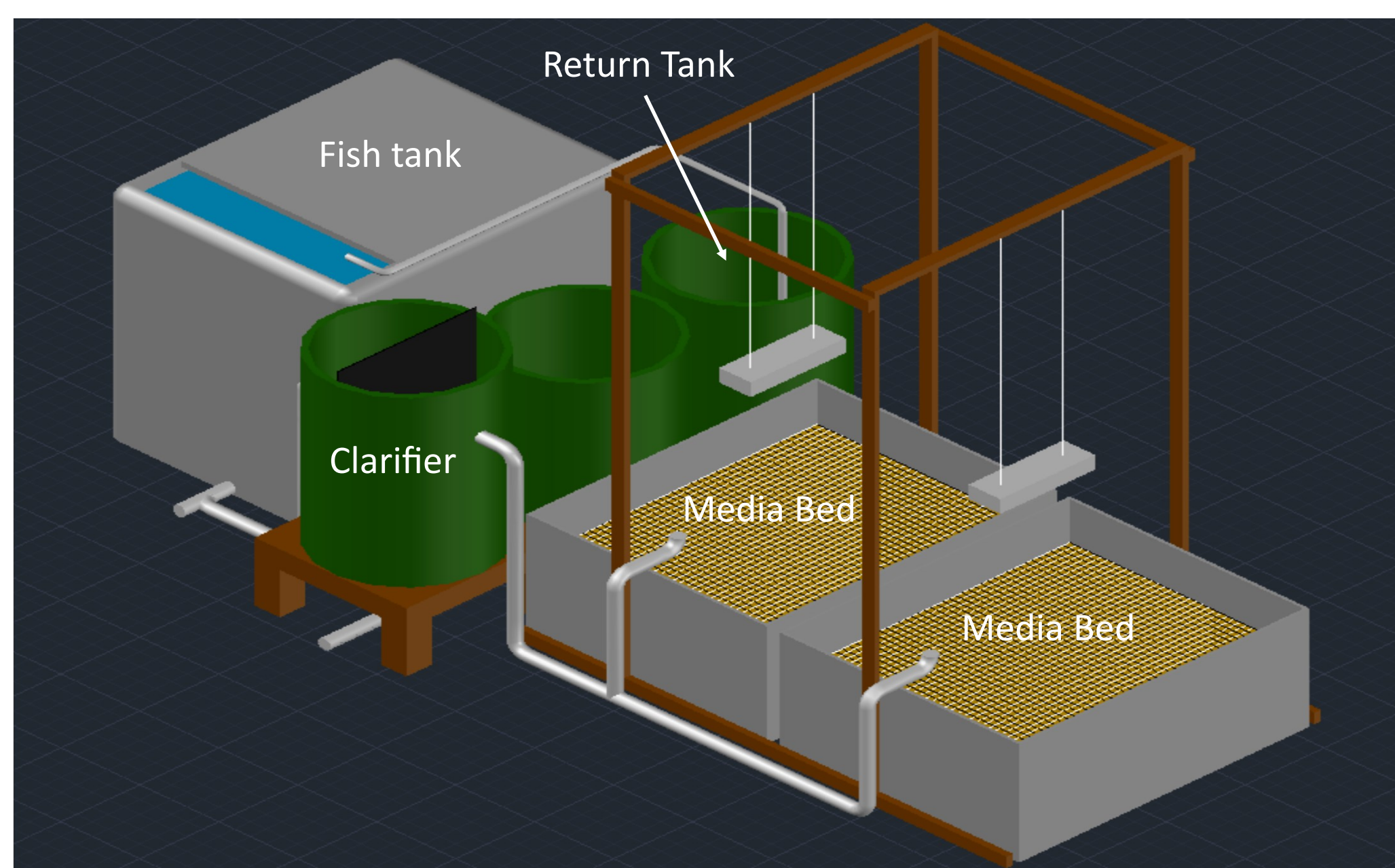
# Sustainable Agriculture: Aquaponic Solutions

Brandon Bickom & Micah Hess



## Project Overview

The Sustainable Agriculture team works to design systems to help communities struggling with malnutrition and infertile soil. This will be achieved through the use of aquaponics, a method of raising fish and plants in a closed aquatic system. The team is operating and modifying an aquaponic system at Messiah College to complete a design from which manuals will be made for delivery to our clients.



Auto-CAD model of Prototype System

## Clients

The Sustainable Agriculture team serves both Sheltering Wings and Trans World Radio (TWR). Sheltering Wings funds a woman's shelter and an orphanage in Yako, Burkina Faso. The system would be used to support the shelter and orphanage as well as a tool for community outreach. TWR, ministers to communities through Christian radio broadcasts. They will build and operate an aquaponic system using our design manuals at their location in Benin, Africa. This will allow for testing our prototype in two similar climates in Western Africa.



Amy Riddering from Sheltering Wings



Garth Kennedy from TWR



Current Prototype

## Progress

This year the team did research in order to improve the system. Investigation and testing was done into new ways of regulating water temperature, aerating the water, and reducing power. Alternative building materials and designs were researched to better meet the needs of clients. A manual on plant care was drafted for identification and treatment of plant nutrient deficiencies and viral and fungal infections to educate clients on how to troubleshoot plant health problems. Progress was made in crop management practices. A trellis was implemented to provide plant support and pruning done to improve plant health. Additional research went into alternative species of fish for the system. New tilapia were purchased and introduced into the system. The team created user manuals for the construction, operation, and upkeep of the aquaponic system. These documents were also translated into French.



Media Bed Prior to Trellis and Pruning

## Conclusion

The team achieved its first successful harvest of cherry tomatoes! Progress was also made in the writing of construction and operation manuals for our clients in both Benin and Burkina Faso. In the future, the team will continue to research the biology and chemistry of the aquaponic system. The feasibility of increasing the scale of the system will also be investigated. A challenge that lies ahead will be installing the first system outside of the Messiah College campus in its actual working environment.

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- Andy Erikson, Mechanical Engineering Technician
- Sheltering Wings: Amy Riddering
- Trans World Radio: Garth Kennedy
- Collaboratory Staff
- Engineering Department



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The Sustainable Agriculture Team: (Left to right) Jared Fonda, Landon Hacker, Brandon Bickom, Micah Hess, Theo Batein, and Noah Shreiner

