DALHOUSIE UNIVERSITY
FACULTY OF ENGINEERING
Department of Mechanical Engineering

Watering Device for Production Cricket Farming

OVIPOST

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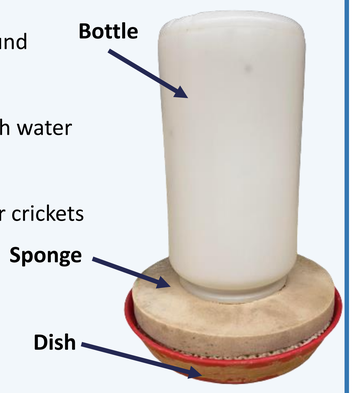
Current Watering Device

Objective

- The primary cost of production cricket farming is labour and monitoring of environmental conditions over the course of a full cricket production cycle

Current Design

- Conventional sports water bottle and round sponges on top of water dish
- Gravity/hydrostatic pressure fills dish with water and prevents spilling.
- Sponges absorb water allowing access for crickets to drink but not to drown



Design Issues

- Prone to tipping
- Requires frequent refilling
- Bacterial and fecal accumulation on the sponges
- Modification required for use with pinheads

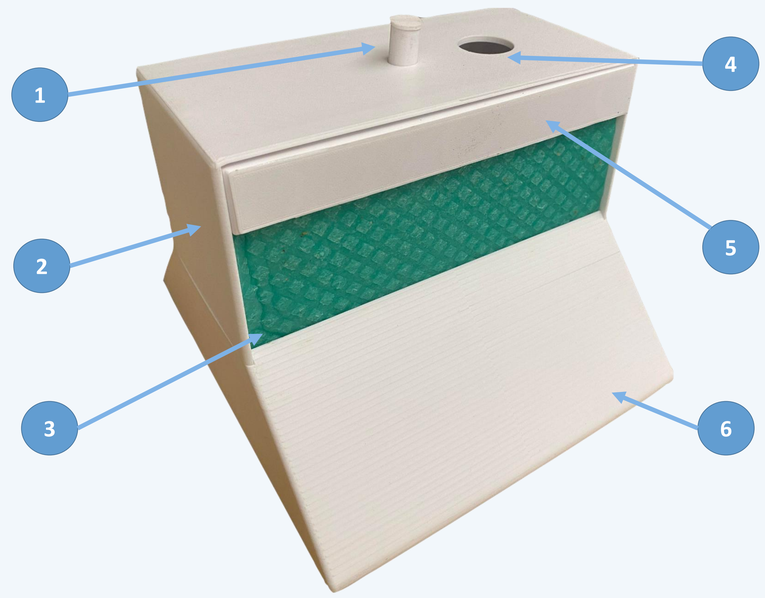
Requirements

1. Must provide 10L of water over the crickets 7-week production cycle
2. Must be compatible with all stages of cricket life cycle (*See cricket size guide*)
3. Maximum 1 hour to understand proper design operation and components
4. Materials used prevent water contamination and are suitable for insect and employee health
5. Employees must be able to clearly and easily monitor water levels
6. Must not tip when 5 N of force is applied at any part regardless of water volume remaining
7. Must prevent rats and other pests from accessing water source
8. Maintains functionality (no leaking or tipping) up to a maximum 15° incline
9. Per unit cost of $80 USD desired
10. The total device height must be under 10” to ensure insect retention
11. One year duration prior to failure of non-porous components
12. Materials used must be replaceable within a two-week time frame
13. The entire device must be easily sanitized with bleach and water in less than 30 minutes without the need for intense scrubbing

Final Design

- Current prototype holds 2.8 L of water (can be scaled to volume of 10 L). Utilizes two sponges oriented lengthwise and has a total height of 7.5”
- Material cost for the final design is $66.10 USD
- Simplistic design allows for easy understandability and operation
- All materials are easily sourced within fourteen days if replacement parts are required
- Full PETG construction guaranteeing water resistance, customizability, easy sanitation, while meeting all health requirements

Part #	Name	Description
1	Mechanical Float	Allows for visual water level monitoring
2	Removeable Top	Allows easy cleaning of internal/external surfaces
3	Vertical Sponges	Prevents accumulation of debris on sponge without leaking water
4	Refill Hole	Allows for refilling without removing the top
5	Magnetic Strips	Secures sponges and prevent access to reservoir
6	Textured Ramp	Provides slip resistant surface for climbing



Cricket Size Guide[1]

Testing and Verification

Sponge Testing/Evaporation Rates

- The sponges remain damp and absorb water at a rate of 13.92”/hour.

Environmental Testing

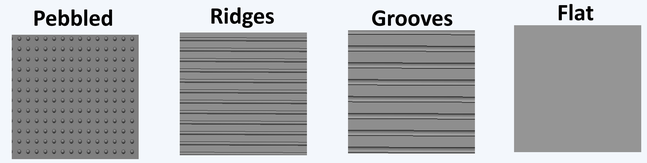
- Device is functional in environmental conditions used for cricket production

Force and Angle Testing

- The device avoids leaks and spills up to a maximum incline of 15-degrees and maximum force of at least 5 N

Testing Different Textures

- The preferred texture for use by the crickets was the ridges



Cleaning Test

- Surfaces were compatible with water and bleach mixture, with all textures except pebbled being able to be cleaned in less than 30 minutes

Testing with Different Sizes of Crickets

- Used with all sizes of crickets with no recorded deaths due to the device

Recommendations and References

Recommendations for Further Improvements

- Investigation into the feasibility of external water distribution to reduce the design and reservoir size necessary
- Exploration into improved water level monitoring strategies/technology
- Testing at production scale to confirm viability of design in Ovipost environmental conditions
- Further testing to verify durability and life span requirements are met

References

1. Ovipost. (n.d). Products: *Live crickets*. https://www.ovipost.com/products/live-crickets
2. Campbell, S. (2019). *Standard Operating Procedure for Rearing Crickets.* Internal Ovipost Report: unpublished