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Background

- Low survival over time
- Low pupation/eclosion rate
- Many projects to improve
 - Wood and roots as resources
 - Manufactured feed
 - Microbiome
 - Tube orientation
 - Wild vs captive biofilm





Objectives

- 1. Improve F1 adult production
 - Phase I Determine if a box design can maintain or improve pupation/eclosion rates
 - Phase II Determine if higher larvae densities can maintain or improve pupation/eclosion rates
 - Phase III Determine if adding wild-cultivated biofilm will improve pupation/eclosion rates compared to captivecultivated biofilm
- 2. Write a CSRB propagation handbook



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Methods – Phase I Boxes vs Tubes

- Three boxes 20 larvae each
- Approximately 90 days
- Survival and pupation recorded



Results – Phase I Boxes vs Tubes

- Weak larvae
- Low survival, one pupation
- Box overflowed easily
- Tubes selected for Phases II and III
- Evidence for use of flow through

Methods – New Flow-Through System



- Large heated sump
- Hoses with heat exchanger coils
- Caddies to hold tubes
- Back up recirculating capability

Methods – Adults for F1 Larvae Production

- Producing for Phase II and III
- 60 adults to reproduce







Methods – Phase II Density

- Treatments of 20, 30, and 40 larvae per tube
- Three replicates per treatment
- Trial duration dependent on larvae stage

Methods – Phase III Biofilm

- Resources conditioned in Comal Springs
- Three replicates of 20 larvae
- Higher densities if possible
- Use Phase II for comparison



Implications So Far

- Moving to a flow-through system will benefit CSRB
 - Better survival and pupation
 - Less cleaning = less stress
- Using tubes is the best method so far
 - Better mimics flow of a spring
 - Easier-opening tubes





Future Implications

- Can we use higher densities the Refugia?
 - Fewer tubes needed to produce F1s
 - Less water needed to support the same population size
- Is wild biofilm superior in practice?
 - If yes improve Refugia production
 - If no pursue other research avenues

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Methods – CSRB Propagation Handbook

- Review of all information
 - Reports
 - Manuscripts
 - Husbandry records
 - Research outcomes



Future Implications

- Current information aggregated
 - See implications easier
 - Identify gaps in information for future research
- Provide guide for CSRB propagation
 - Future husbandry and research team members
 - Research associates (BIO-WEST, TXST)











Thank You!

- Edwards Aquifer Authority
- BIO-WEST partners
- Texas State partners
- Husbandry team
- SMARC staff

Questions?