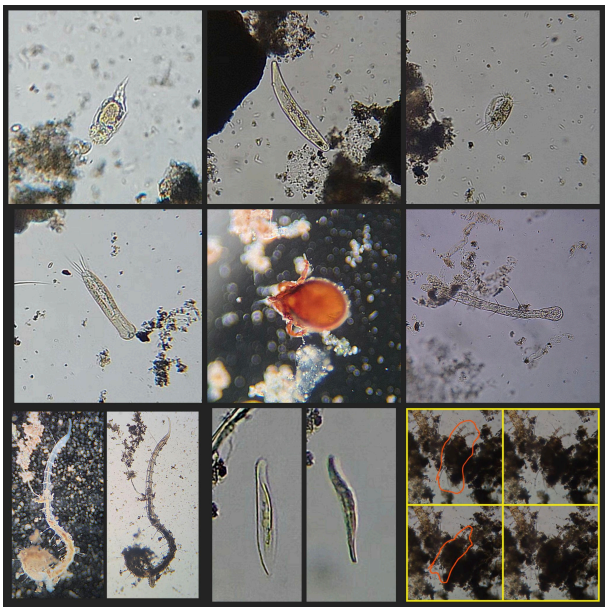
SUBEX Summary

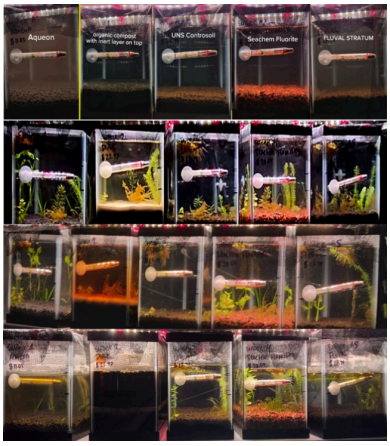


Project: Substrate Comparison Experiment (SUBEX-2025-05-01)
Researcher: Victor Vital Barreto Conte
Duration: 148 Days (May – Oct 2025)
Location: Independent Research Lab

Research Objective

To empirically evaluate the ecological trade-offs and claims between nutrient-rich "active" soils (e.g., Fluval Stratum) and inert substrates (e.g., Seachem Flourite, Sand) regarding plant biomass production vs. microfaunal biodiversity in closed aquatic systems.

Methodology



Setup: Seven controlled 2.5-gallon glass aquarium with distinct substrate treatments (Commercial vs. Organic vs. Inert Controls).
Data Collection: Weekly water chemistry logging (pH, TDS, NH3/NH4+, NO2-, NO3-), photogrammetry, and microscopic analysis of benthic zones.
Biological Inoculation: Standardized microbial and microfaunal blends (Rotifers, Gammarus sp., Ostracods) introduced to test colonization rates. Flora: Standardized planting of Cryptocoryne, Sagittaria, Salvinia minima, and others.

Key Findings

The Biomass vs. Biodiversity Trade-off: A distinct divergence was observed. Inert clay (Seachem Flourite) produced the highest plant biomass but low microbial diversity. Conversely, volcanic soil (Fluval Stratum) facilitated a complex "detritus-driven" food web (high counts of Vorticella, Gammarus, and Annelids) but moderate plant growth.
Stress-Induced Root Adaptation (Novel Finding): Cryptocoryne hudoroi specimens in nutrient-depleted inert sand controls developed significantly more extensive root systems than those in nutrient-rich soils. This suggests a survival mechanism prioritizing root scavenging over foliar growth in low-nutrient environments.
Substrate Integrity & Micro-habitats: Microscopic analysis revealed that active soils (UNS Controsoil) underwent structural fracturing, increasing surface area for bacterial colonization but reducing pore water circulation compared to chemically stable inert substrates.