



Domestic wastewater treatment with purple phototrophic bacteria at ambient and cold temperatures – non destructive partitioning

Introduction

Current wastewater practice is wasteful of energy and nutrients. Resources need to be recovered.

New concept: Simultaneous, non-destructive, assimilative organic, nitrogen and phosphorous removal by PPB

Purple phototrophic bacteria (PPB) grow anaerobically with small light energy needs and no need of CO₂.

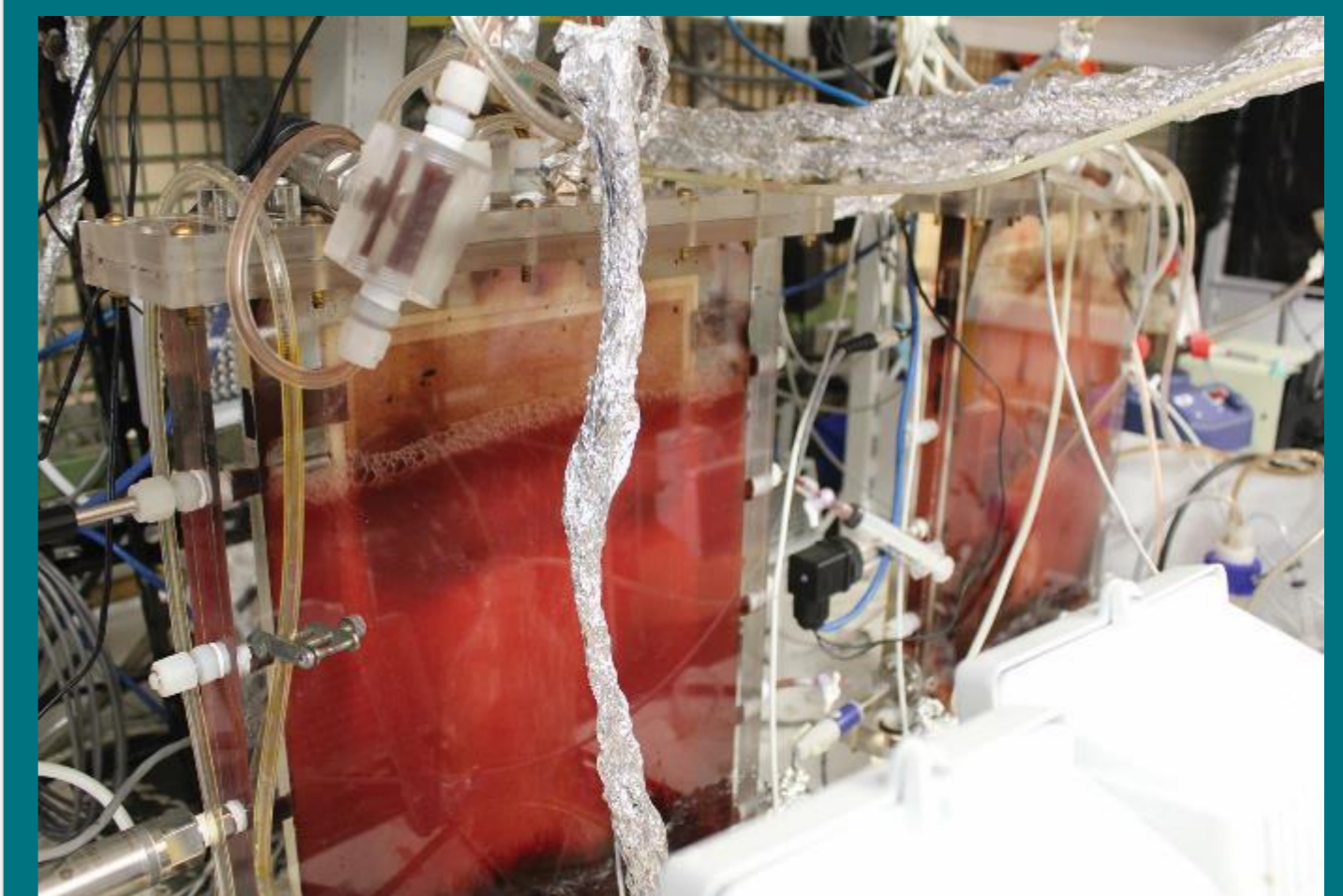
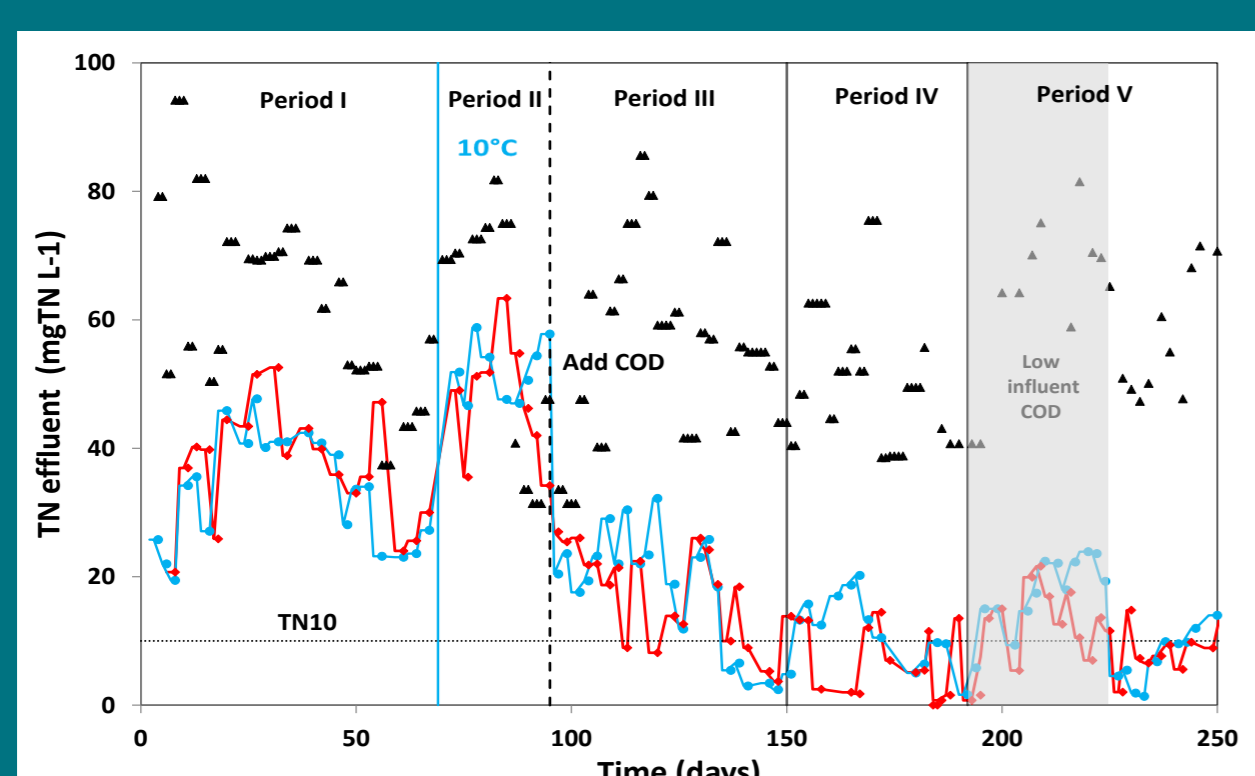


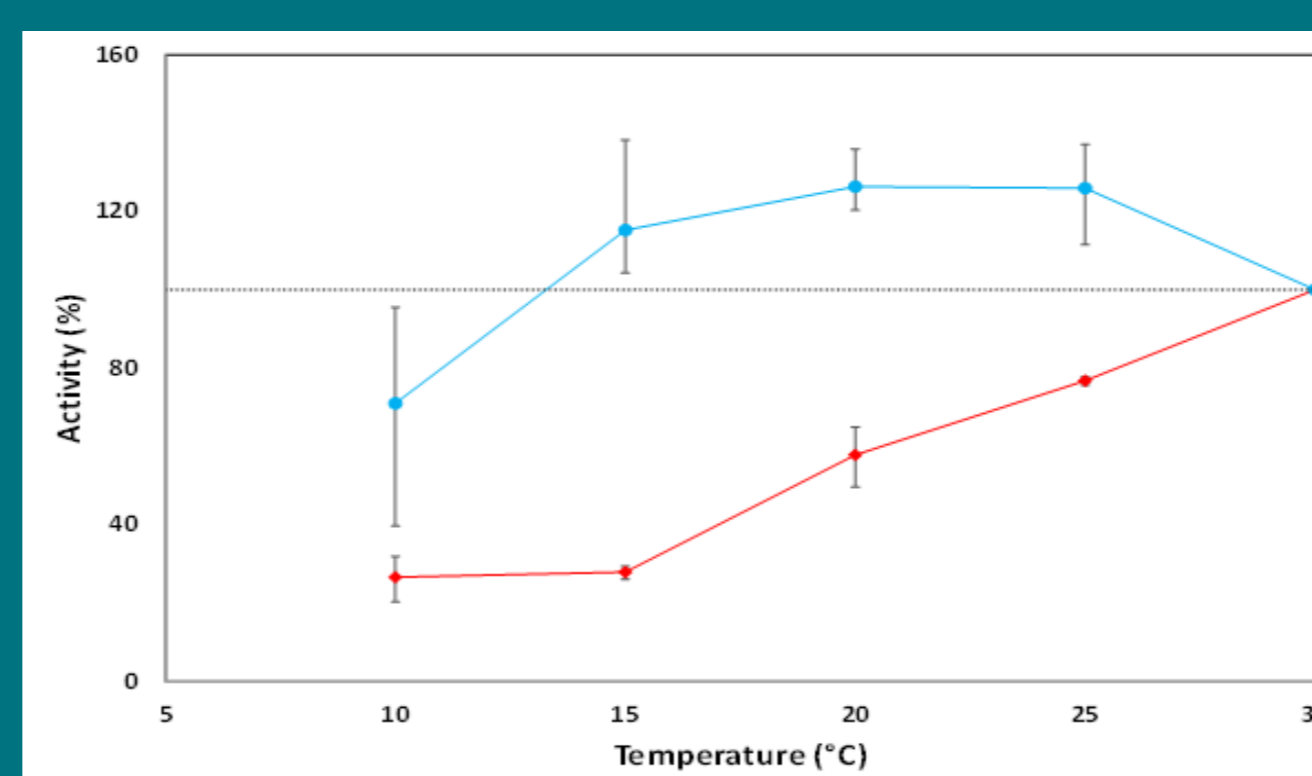
Photo of the photo anaerobic Membrane bioreactor

Results

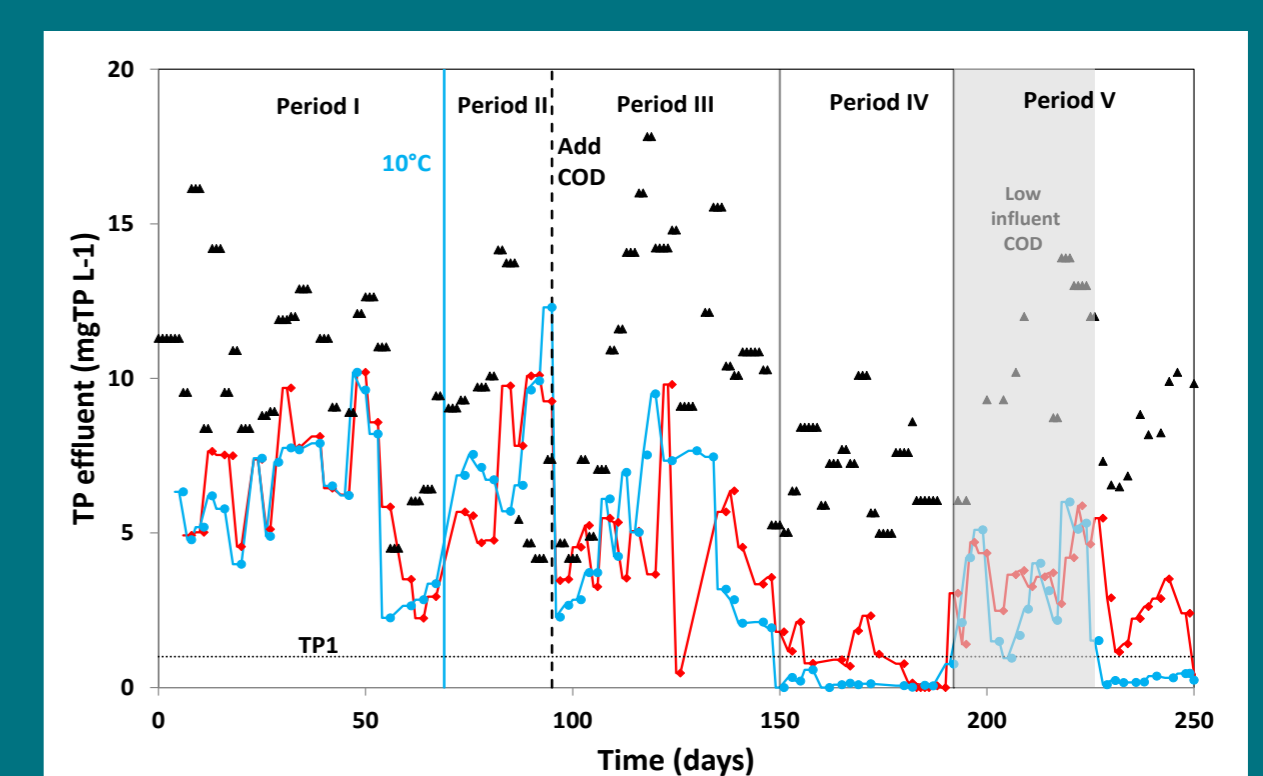
- Assimilative activity and biomass yield at 10°C are comparable to ambient temperatures, leading to efficient partitioning of COD, N and P for post resource recovery.
 - Anaerobic treatment with PPB of mainline domestic wastewater can achieve discharge limits (TCOD < 100 mgL⁻¹; TN < 10 mg L⁻¹ and TP < 1 mg L⁻¹) in a single stage at SRT <3 and HRT <1 day.
 - Adaptation times around 30 day and PPB dominance in the reactor indicate real case application is feasible.
- Domestic wastewater treatment with PPB at 10°C, achieving discharge limits and assimilating all organics, N and P is feasible.



Comparison TN effluent concentration at 22°C and 10°C



Temperature adapted vs non adapted PPB activity at different temperatures



Comparison TP effluent concentration at 22°C and 10°C