

CRAYFISH FOR SLUDGE MANAGEMENT IN AN AQUAPONIC SYSTEM



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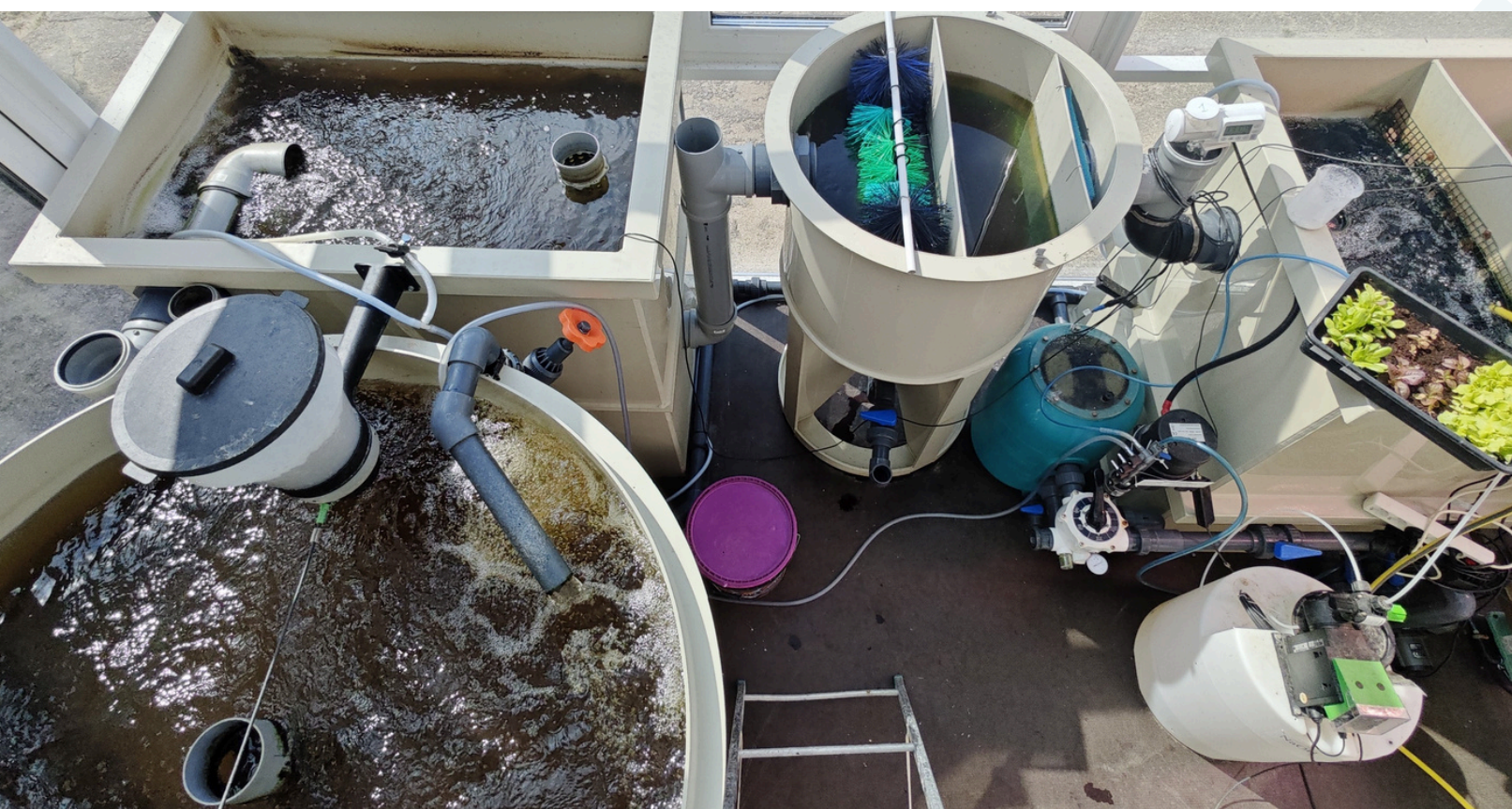


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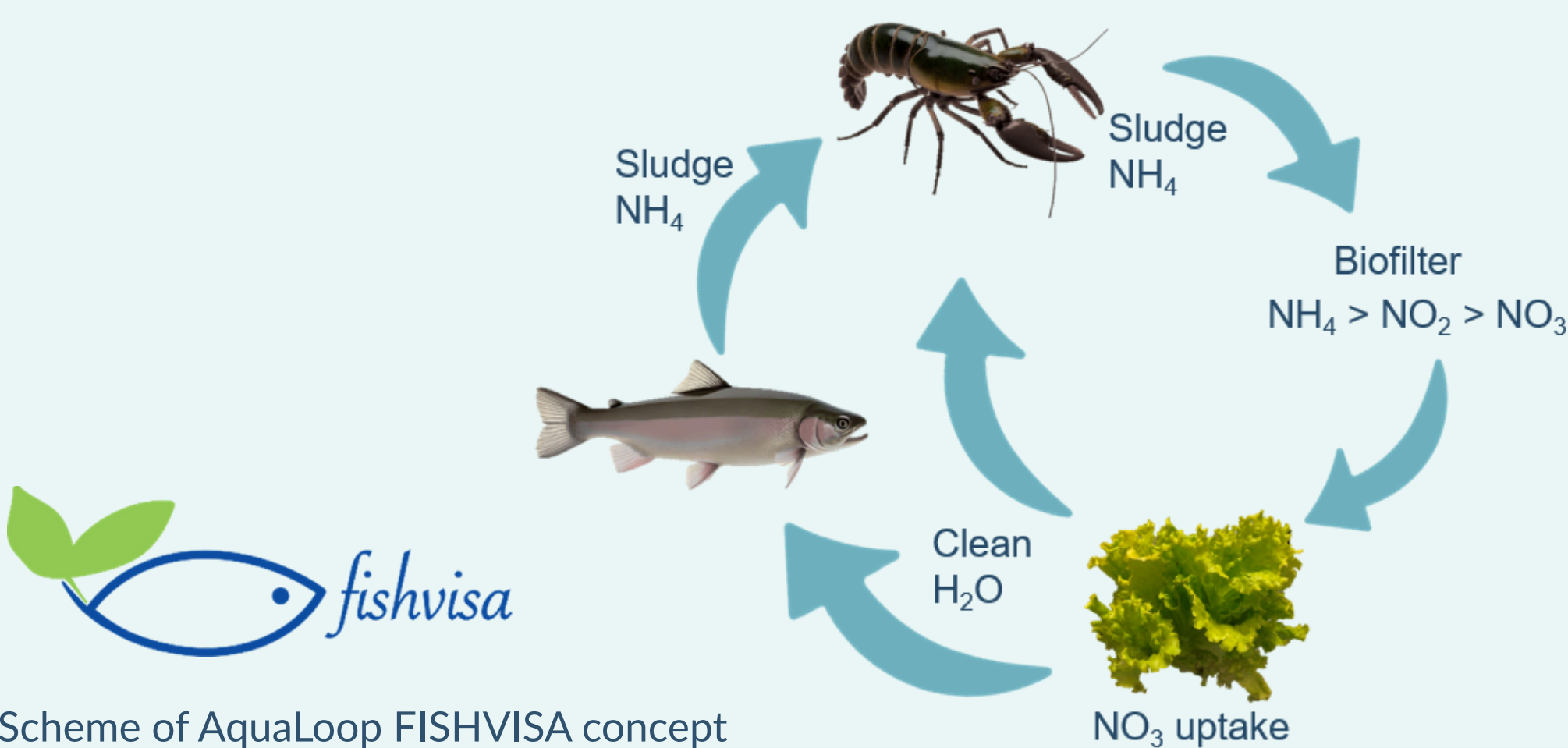
Introduction

- Aquaponics combines fish farming and plant cultivation in a single closed recirculating system.
- Problem: the accumulation of organic sludge, which can compromise water quality, lower system performance, and increase maintenance needs.
- We aim to investigate whether incorporating detritivorous crustaceans could help reduce sludge production and improve system efficiency.



Methods

- Three cycles (28-40 days) of cultivation of rainbow trout (*Oncorhynchus mykiss*), noble crayfish (*Astacus astacus*), and lettuce (*Lactuca sativa*) were performed in a small aquaponics system.
- Measured: average fish, crayfish, and plant weight and total biomass, feed conversion ratio (FCR), and survival rate.
- The total amount of sludge from the fish and crayfish tanks, the amount of sludge consumed by crayfish, and the efficiency of sludge removal by crayfish were calculated.

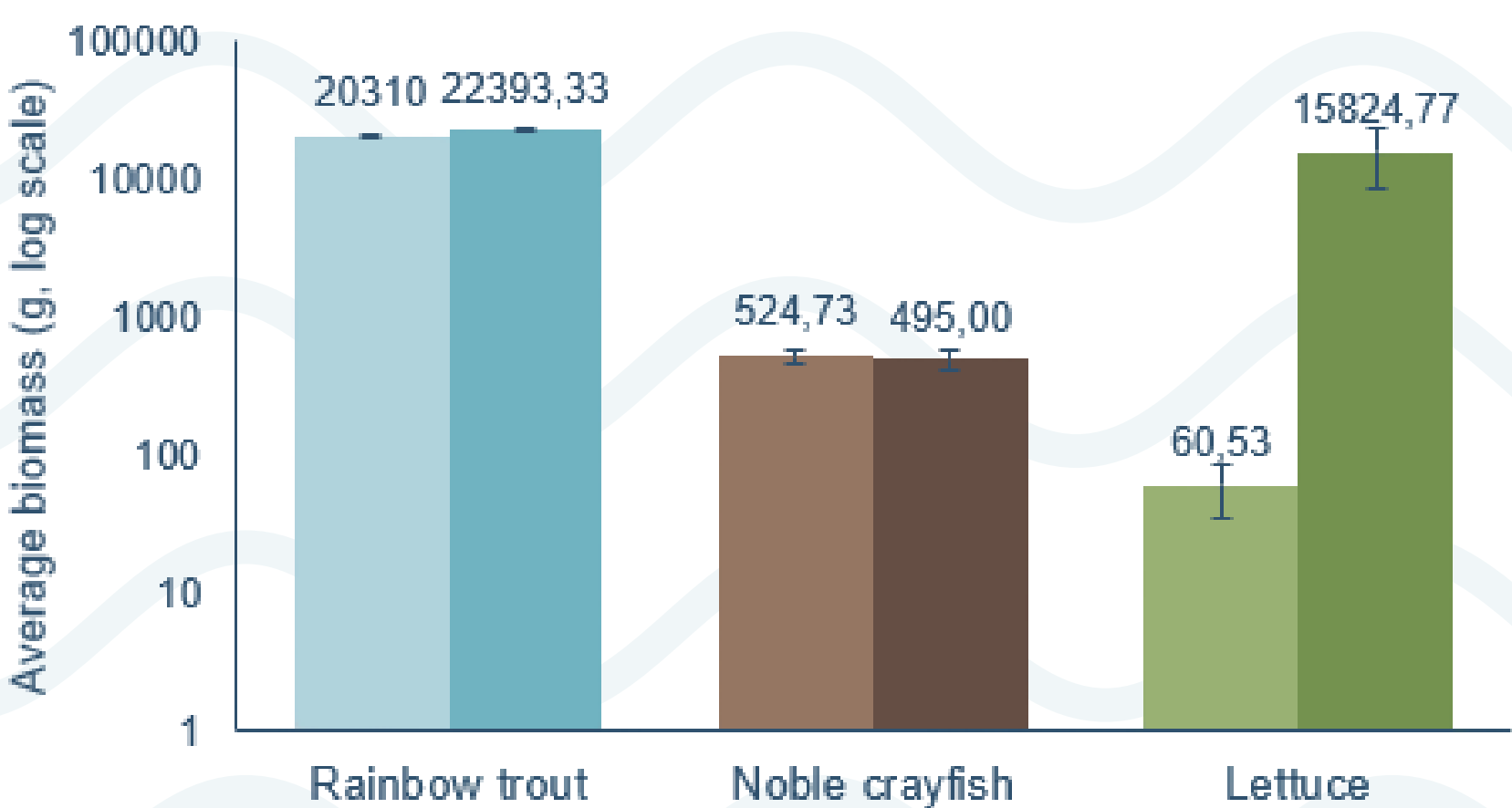


Scheme of AquaLoop FISHVISA concept

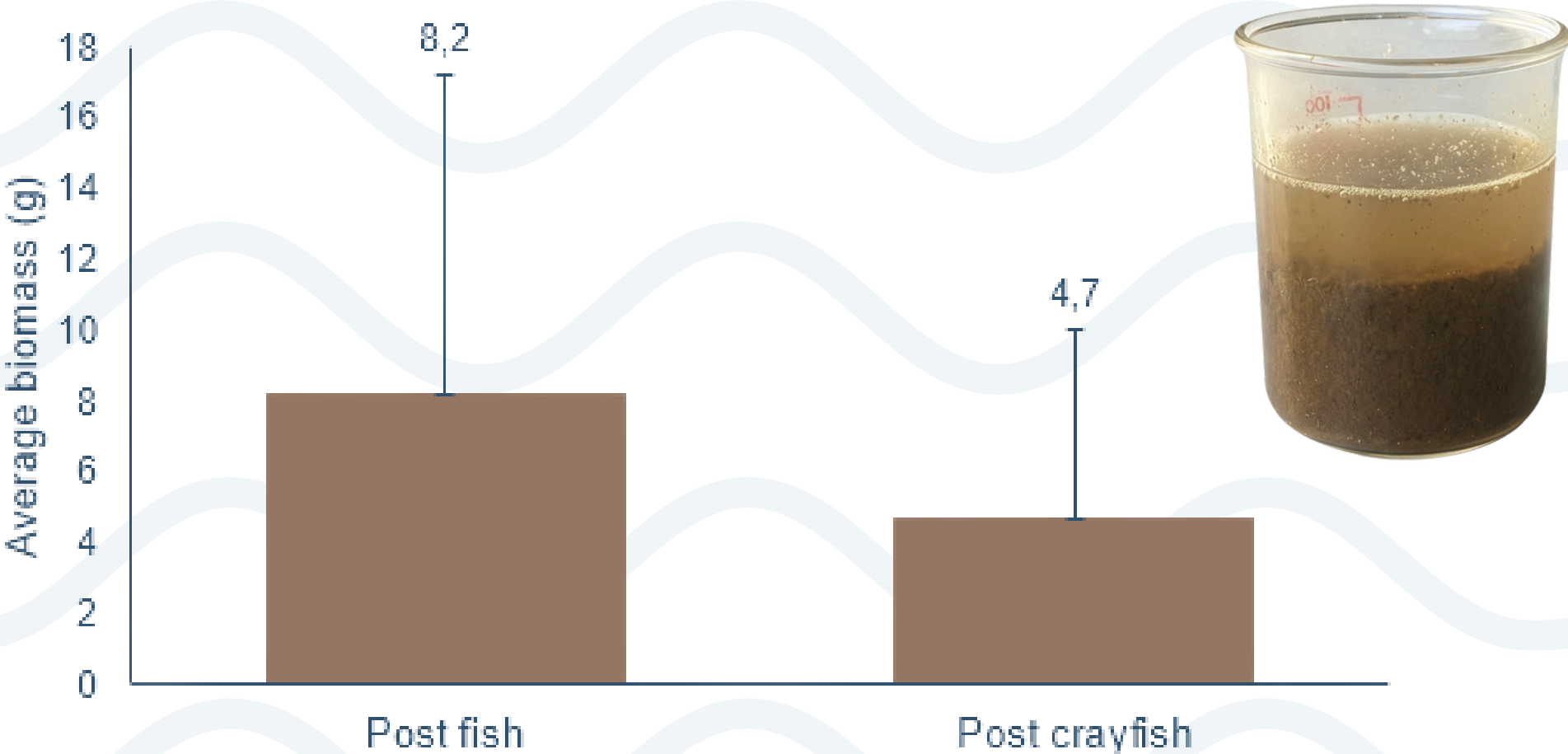
Results

Measured average water parameters.

O ₂ (%)	T (°C)	pH	NH ₄ (mg/L)	NO ₃ (mg/L)	NO ₄ (mg/L)	PO ₄ (mg/L)	Mg (mg/L)	Ca (mg/L)	K (mg/L)
95,4 ± 8,0	19,7 ± 1,5	6,9 ± 0,4	0,6 ± 0,4	0,2 ± 0,4	41,3 ± 16,8	32,1 ± 15,9	20,2 ± 9,6	111,6 ± 39,5	95,1 ± 44,7



Average initial and final biomasses (g) of rainbow trout, noble crayfish, and lettuce.



Average amount of sludge (g) leaving fish and crayfish tanks per hour.

Conclusion

- Crayfish can contribute to sludge reduction in aquaponic systems.
- It is essential to optimize crayfish density, feeding regimes, and tank design to improve sludge removal efficiency and enhance system sustainability.
- An integrated multi-trophic approach will be further tested with other crustacean species.

References

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2. Lenz, G. L.; Loss, A.; Lourenzi, C. R.; Luiz De Alcantara Lopes, D.; Siebeneichler, L. D. M.; Brunetto, G. (2021). Lettuce growth in aquaponic system and in soil fertilized with fish sludge. Aquaculture Research, 52, 5008-5021. <https://doi.org/10.1111/are.15372>.

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