31st International Conference of Young Scientists

Biorefinery of phosphorus from eutrophic water: A circular economy approach

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1. Introduction

- Phosphorus is a non-renewable source
- A need for efficient phosphorus management
- Benefits from the phosphorus present in eutrophic water through two aquatic plants

2. Goals

- Investigating the phosphorus removal ability of *Pistia Stratiotes* and *Lemna minor*
- Examining the effects of different waterbodies on the protein concentration of the 2 aquatic plants

3. Methods

- The trial consisted of 5 treatments per plant species. The various water types: tap water, phosphorus concentrations of 5 mg/L and 50 mg/L, ½ strength Hoagland solution, and wastewater.
- Phosphorus and Brown juice isolation
- Phosphorus content measuring with *Sparks* method

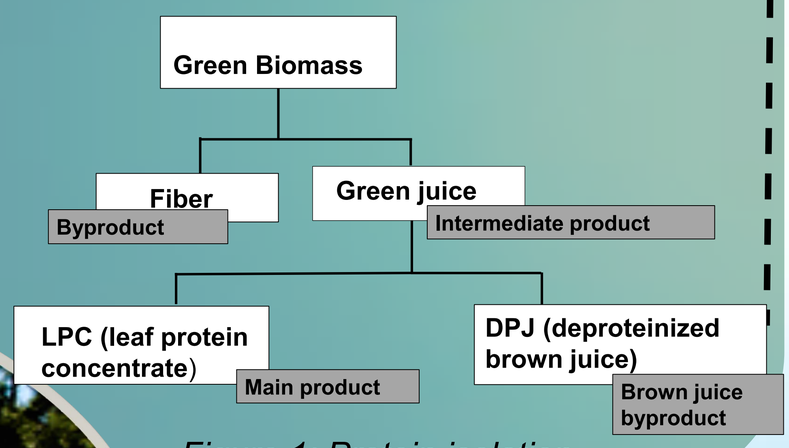

Figure 1: Protein isolation

4. Results

4.1 Fractioning of the plants

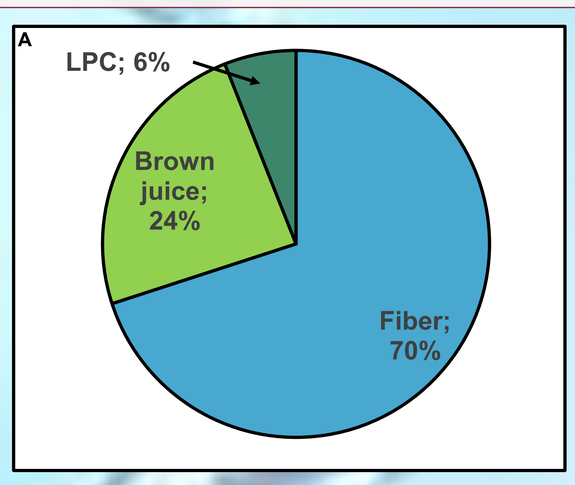

Figure 2: Fraction ratio of the vegetable matter of Pistia stratiotes

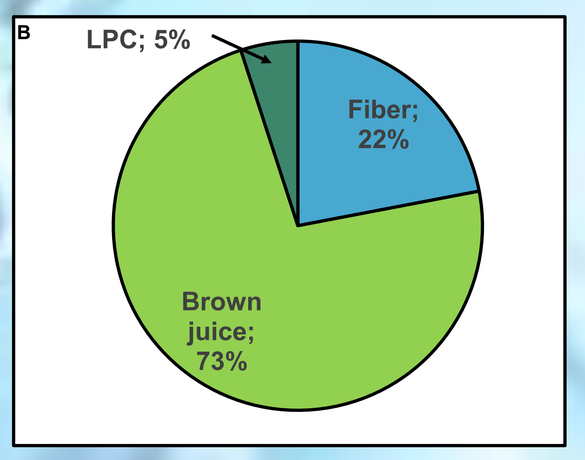

Figure 3: Fraction ratios of the vegetable matter of Lemna minor

4.2 Waterbody experiments

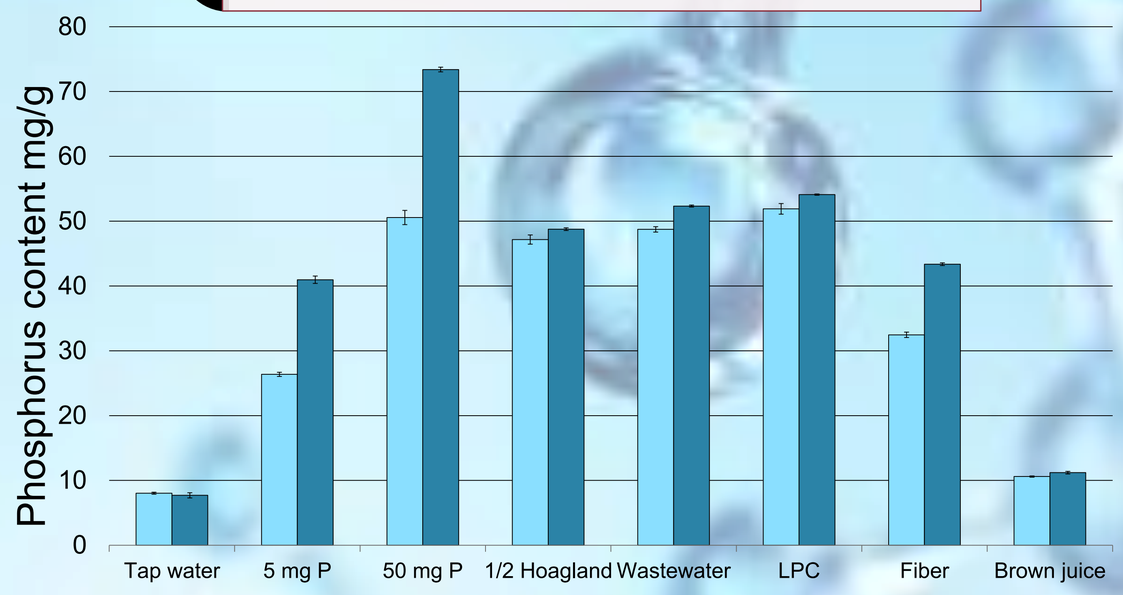

Figure 4: Phosphorus content of the plants post experiment

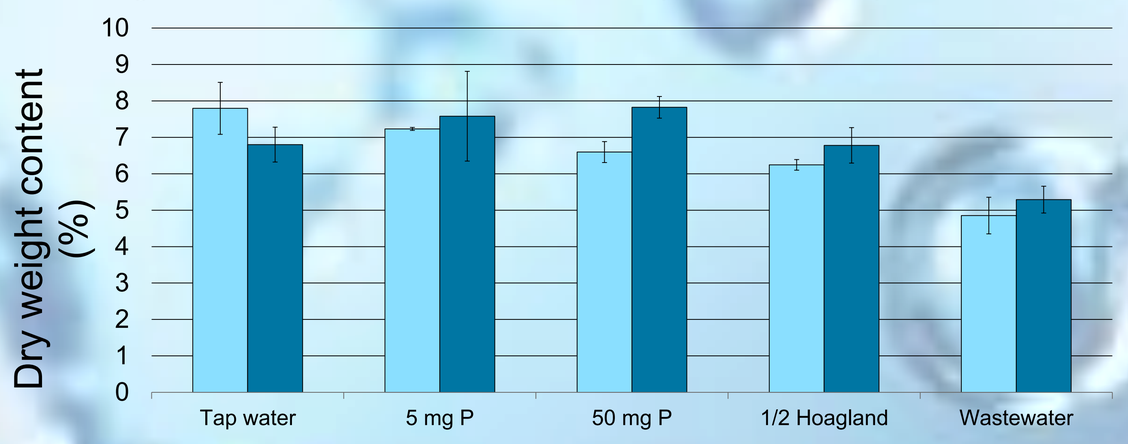

Figure 5: Dry weight content of the plants in the different media

5. Conclusion

As for the phosphorus removing experiment both aquatic plants accumulated considerable amounts of phosphorus in their tissues. *Pistia stratiotes* was more effective in most cases, but as for the wastewater the *Lemna minor* was observed as a better phosphorus removing plant, which can be a very useful tool to prevent and mitigate the effect of eutrophication in standing water.

6. References

Sharpley, A. N., Chapra, S. C., Wedepohl, R., Sims, J. T., Daniel, T. C., & Reddy, K. R. (1994). Managing agricultural phosphorus for protection of surface waters: issues and options. Journal of environmental quality, 23(3), 437-451.