

## Implementation of the circular economy concept in greenhouse production systems: Microalgae and biofertiliser production using soilless crops' drainage nutrient solution

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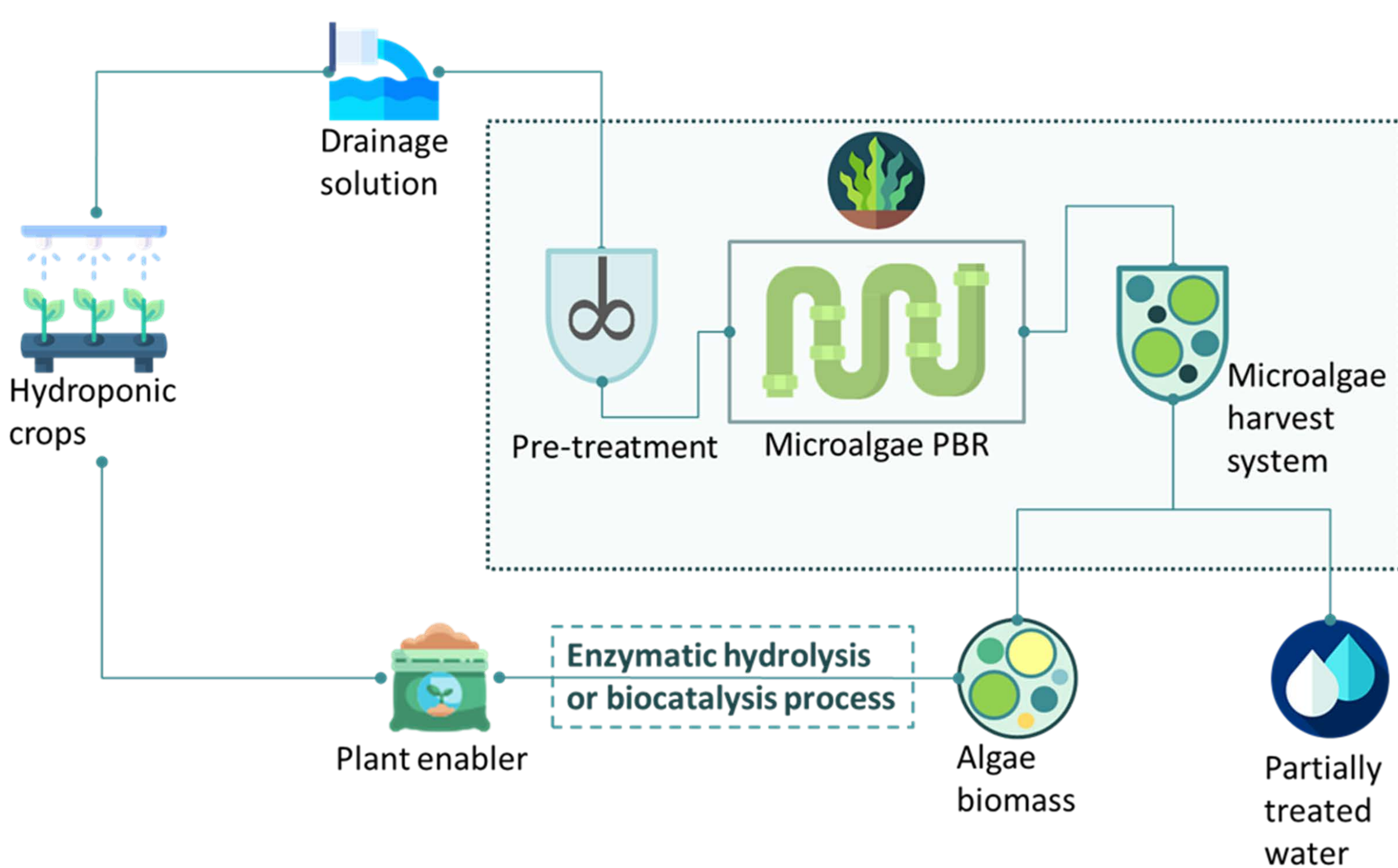
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### OBJECTIVE

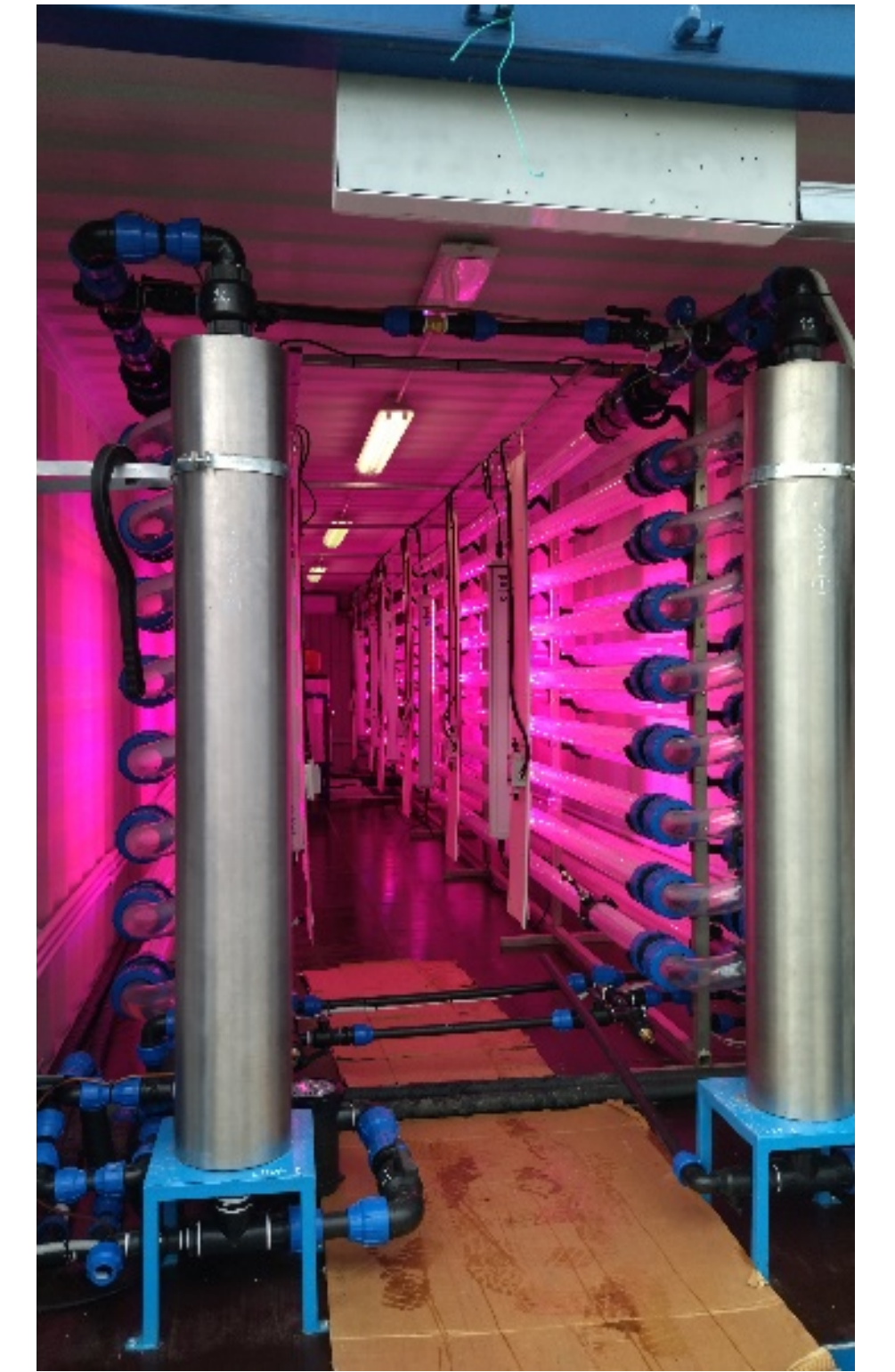
On-site production of biofertilisers from agricultural waste-waters through a robust automated drainage recycling system via an innovative enzymatic hydrolysis procedure

### APPROACH



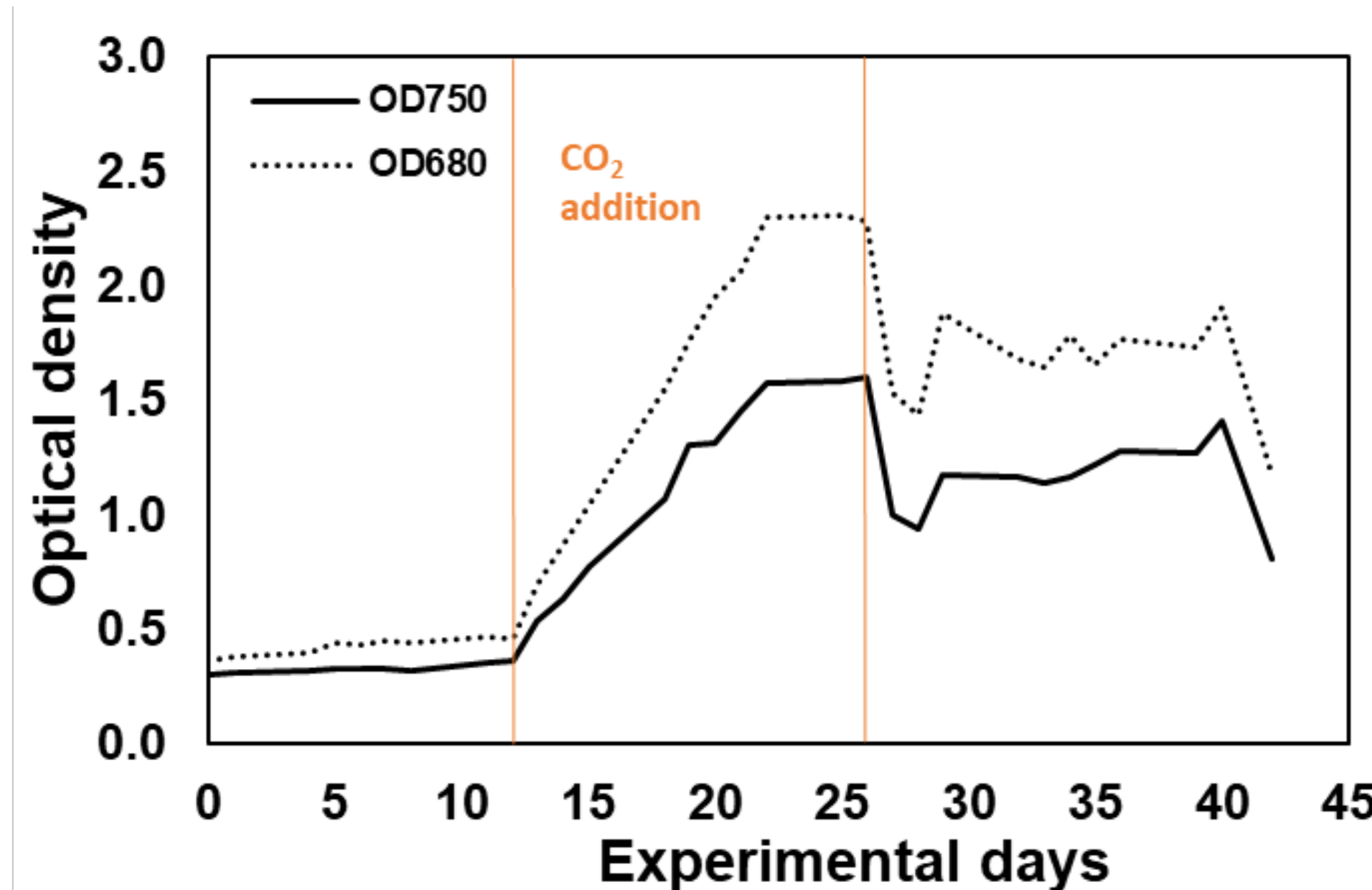
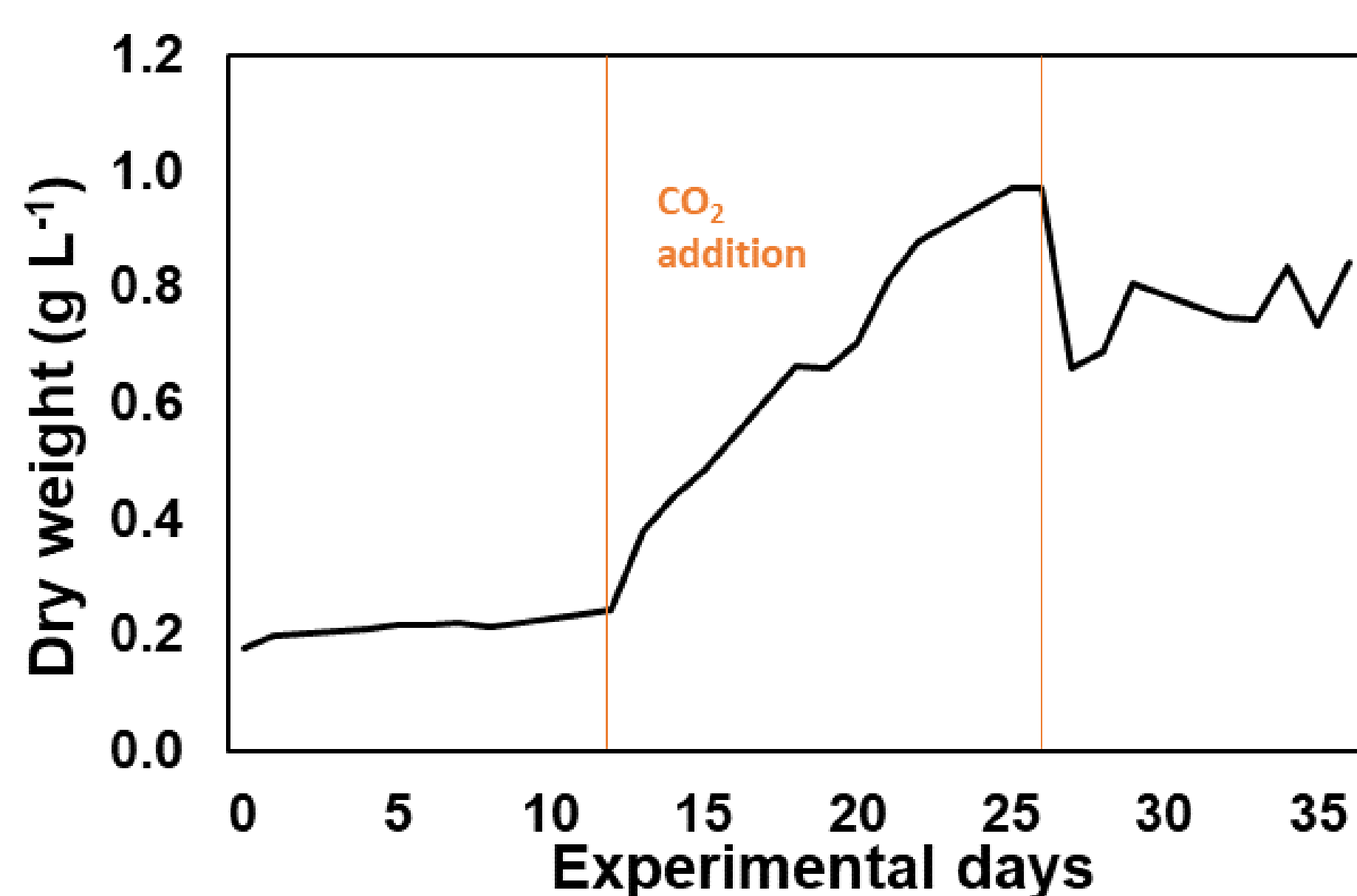
### METHODOLOGY

- ✓ **Waste-Water Collection**  
Source: Agricultural runoff waste
  - ✓ **Microalgae production**  
Closed photo bioreactor: Loop of 1000L  
Equipment: RGB and white lights, CO<sub>2</sub>  
Strain: *Desmodesmus* sp.  
Growth medium: waste-water streams
  - ✓ **Biomass collection**  
Sedimentation tank: Microalgae left for 24h to sediment
  - ✓ **Enzymatic Hydrolysis:**  
Equipment: Innovative enzymatic hydrolysis reactor  
Process: Breakdown of microalgae cellular walls using specific enzymes  
Duration: 24h at 50°C while stirring
- ➔ **Biofertiliser ready to be applied on a crop**



### RESULTS

#### ✓ Production of 5L of biostimulant per day



Water savings	100%
Nitrate savings	74%
Phosphorus saving	100%
Calcium saving	100%
Potassium saving	100%

### CONCLUSION

- ✓ Successful development and implementation of the system while reducing waste-water pollution.
- ✓ By recycling nutrient-rich drainages, water conservation is promoted, and the reliance on synthetic fertilizers is reduced, mitigating nutrient leaching and eutrophication.
- ✓ A near-zero discharge system that efficiently uses water and nutrients to produce food safe for human consumption

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