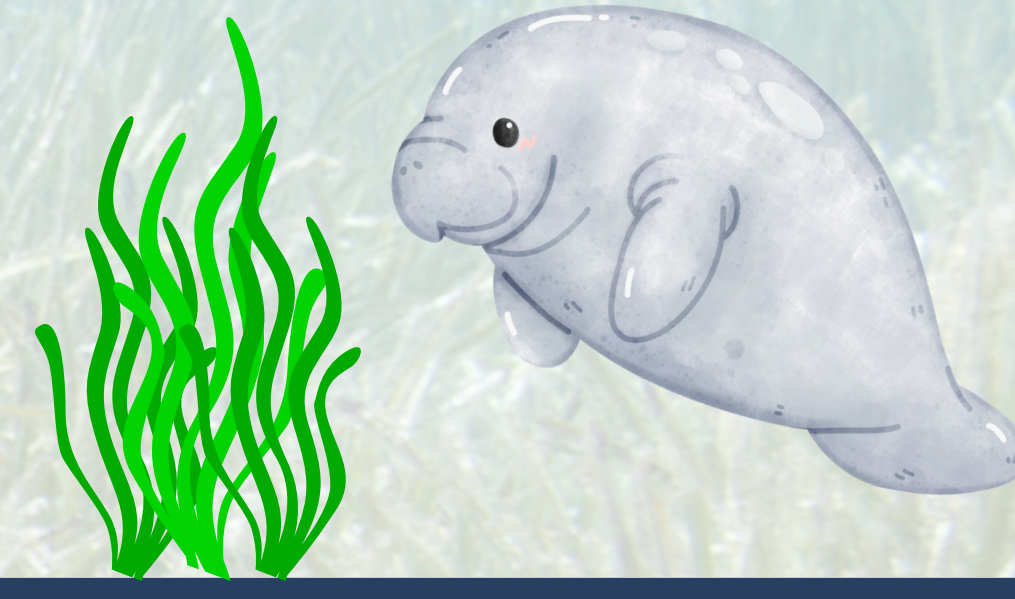


Biological treatment of wastewater in marine shrimp farm with *Enhalus acoroides* grown in paper cups and gunnysack

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Abstract

Sea grass (*Enhalus acoroides*) plays an important role in treating wastewater from marine shrimp ponds, which are one of the major economic sectors in southern Thailand. Common wastewater treatment methods include sedimentation and aeration; however, these methods involve high costs and may result in chemical residues. At present, sea grass ecosystems have significantly deteriorated, and existing sea grass propagation methods exhibit slow growth rates that are insufficient to support timely ecosystem restoration. Therefore, this study aimed to investigate the treatment of shrimp pond effluent using sea grass cultivated in paper cups and gunnysack. The experiment consisted of four cultivation treatments: (1) cultivation using shrimp pond effluent and sand, (2) cultivation using shrimp pond effluent and paper cups, (3) cultivation using shrimp pond effluent and gunnysack, and (4) cultivation using seawater without sand. Growth parameters, including leaf width, leaf length, and number of leaves, were measured. The results indicated that cultivation using gunnysack exhibited the highest growth rate. Water quality parameters, including pH, water temperature, transparency, dissolved oxygen, nitrate-nitrite concentration, and salinity, were also measured. It was found that cultivation using...

Keywords : water treatment, *Enhalus acoroides*, breeding, paper cups, gunnysack

Introduction



Research questions

- 1.Does the quality of marine shrimp farm wastewater differ when treated with tape grass cultivated in paper cups and gunnysack?
- 2.Does the growth of tape grass vary between cultivation in paper cups and gunnysack within a shrimp farm wastewater environment differ?

Hypothesis

- 1.The quality of shrimp pond effluent treated with tape grass cultivated in paper cups differs from that treated with tape grass cultivated on gunnysack.
- 2.The growth rate and survival rate of tape grass cultivated in paper cups differ from those cultivated on gunnysack.

Materials and Methods

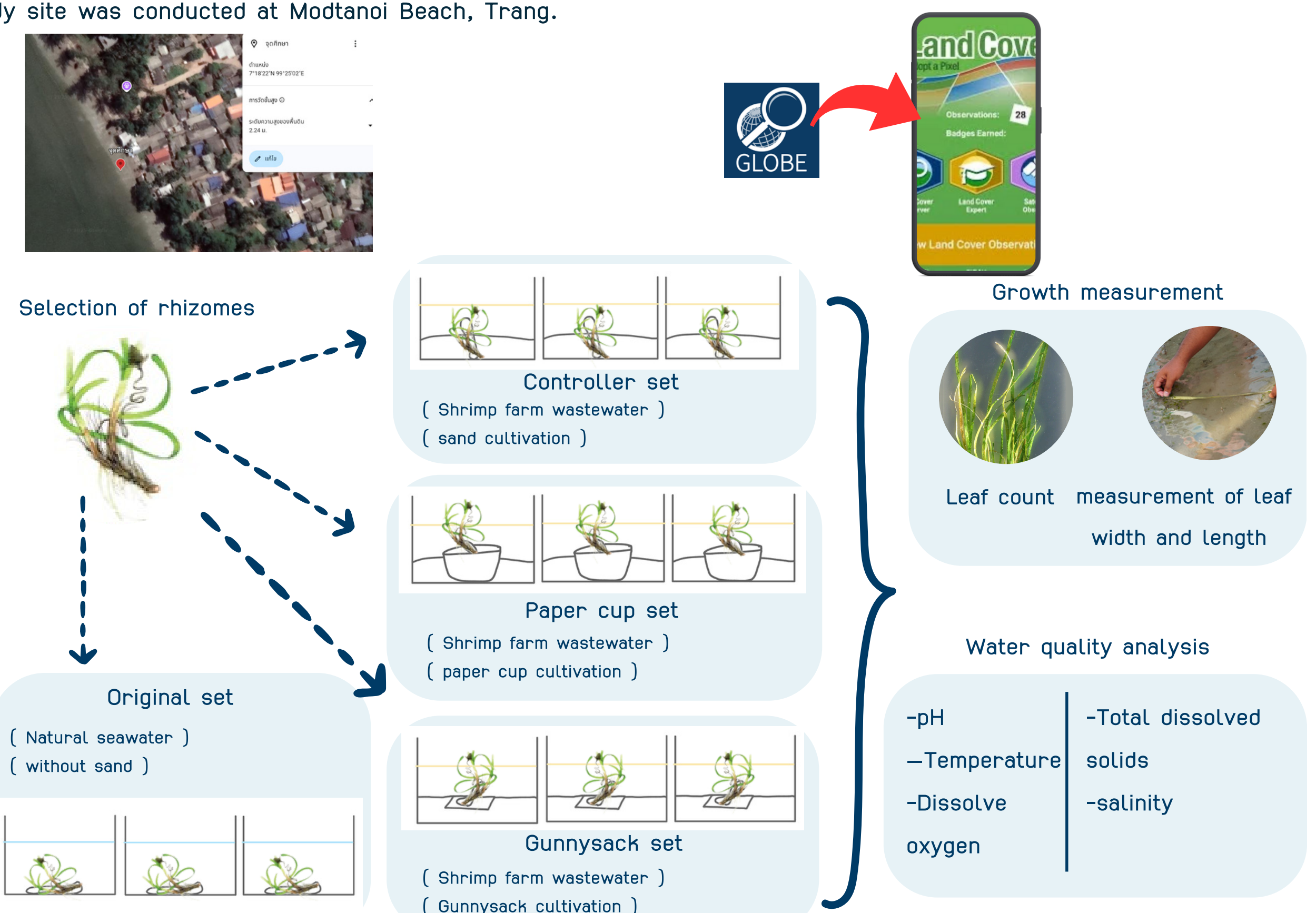
Material



Study Area

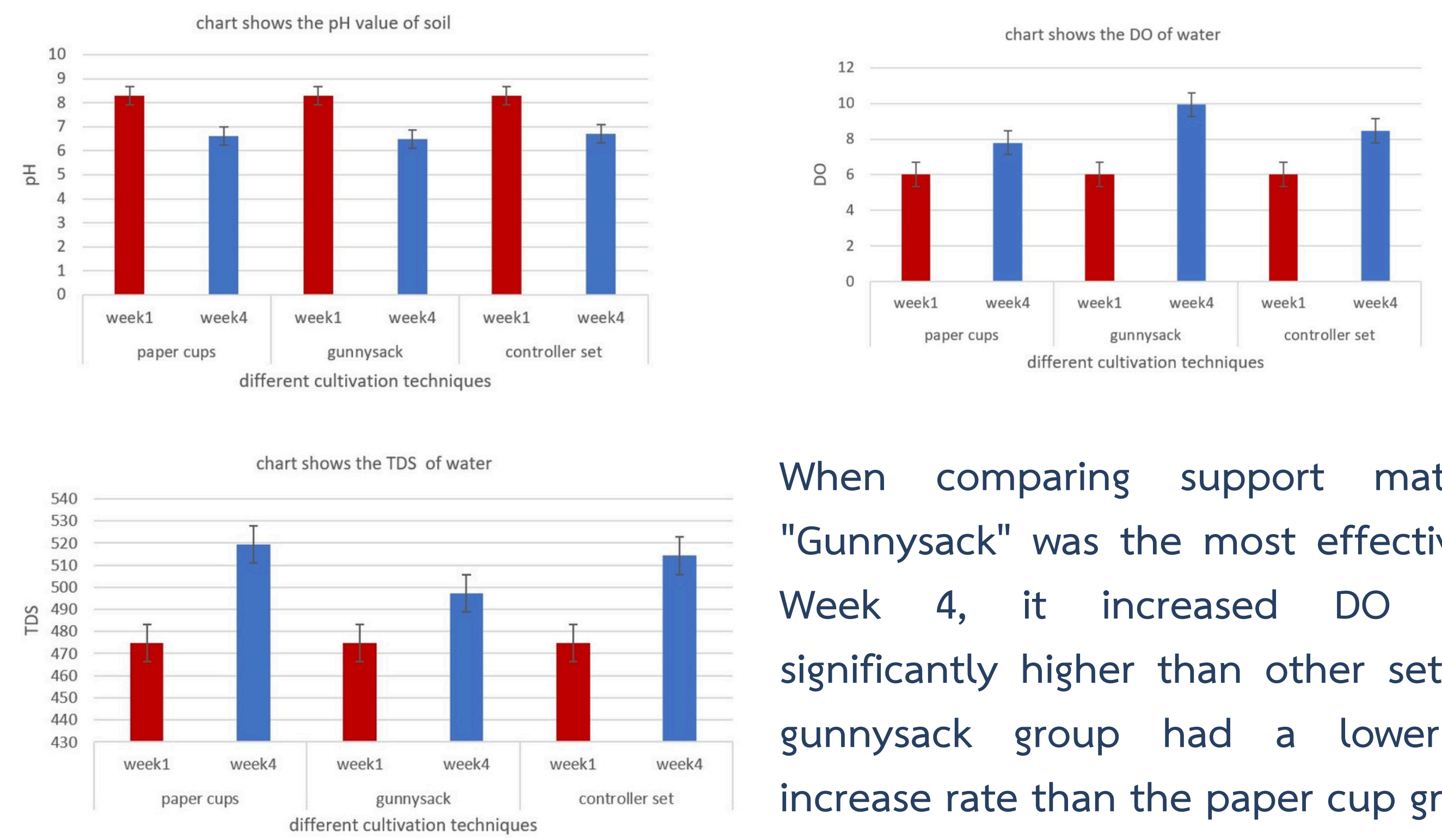
Study site was conducted at Modtanoi Beach, Trang.

Data Recording : land cover



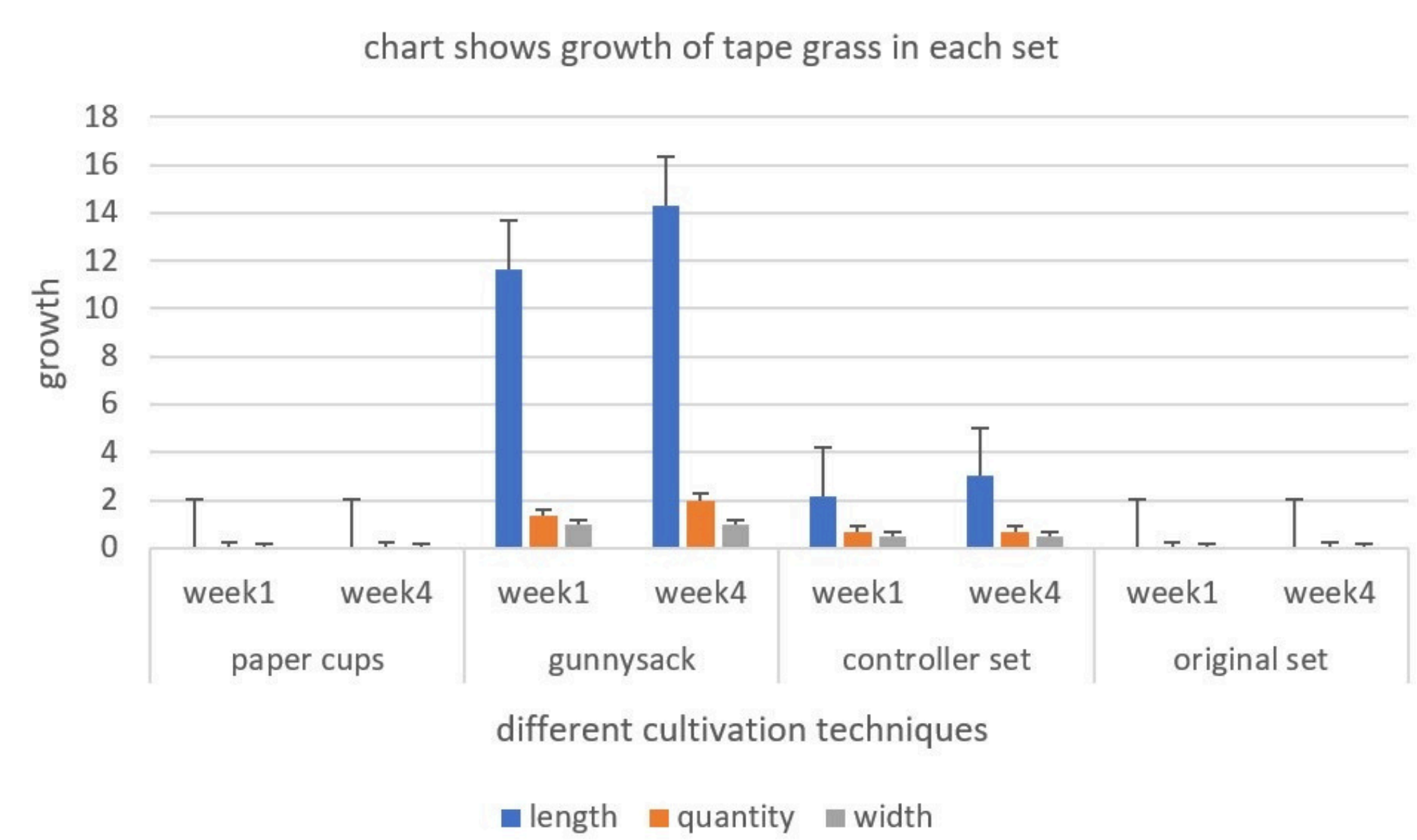
Results

1 A Study on Water Quality Resulting from Different Tape Grass Cultivation Methods



When comparing support materials, "Gunnysack" was the most effective. By Week 4, it increased DO levels significantly higher than other sets, the gunnysack group had a lower TDS increase rate than the paper cup group.

2 The study of the growth of seagrass by various planting methods.



The gunnysack sets has an increase in both leaf length, number of leaves and leaf width most clearly in 4 weeks.

Discussion and Conclusion:

Efficiency in Improving Effluent Quality (Hydrosphere Impact): The study found that *Halophila ovalis* has significant potential to improve shrimp farm effluent quality, particularly by increasing Dissolved Oxygen (DO) and stabilizing pH suitable for the ecosystem. When comparing support materials, "Gunnysack" was the most effective.

Growth Rate and Biological Factors (Biosphere/Biometry): Biometric results show that planting material significantly affects survival and development. Seagrass planted in gunnysacks had the highest growth rate in terms of leaf number, width, and length over 4 weeks.

This study proves that using gunnysacks as a support material for seagrass is the Optimized Design for environmental engineering in shrimp farm wastewater treatment. It promotes both plant growth and water rehabilitation efficiency. This data can be applied as a prototype for marine ecosystem restoration and local pollution management, leading to global sustainability in accordance with GLOBE guidelines.

Citations

- Department of Marine and Coastal Resources (DMCR). (2017). Seagrass. Accessed 28 January 2025,
 Marine and Coastal Protected Area "Trang Provincial Coast". (2017). Seagrass. Accessed 28 January 2025,

Acknowledgments

The author would like to express sincere gratitude to Teacher Sirikwan and Putti for their valuable guidance and advice. Special thanks are also extended to Princess Chulabhorn Science High School, Trang, for providing support for this research.