

# Using non-invasive method to detect the actually growth rate of hard corals on electro-stimulated structure in Sabang-Aceh, Indonesia

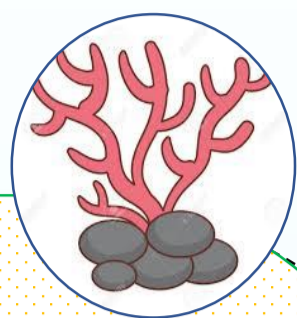
Munandar<sup>1</sup>, Shang-Yin Vanson Liu<sup>1</sup>

<sup>1</sup>Department of Marine Biotechnology and Resources, National Sun Yat-Sen University, Kaohsiung 804, Taiwan

Correspondence: munandar@utu.ac.id



## Introduction



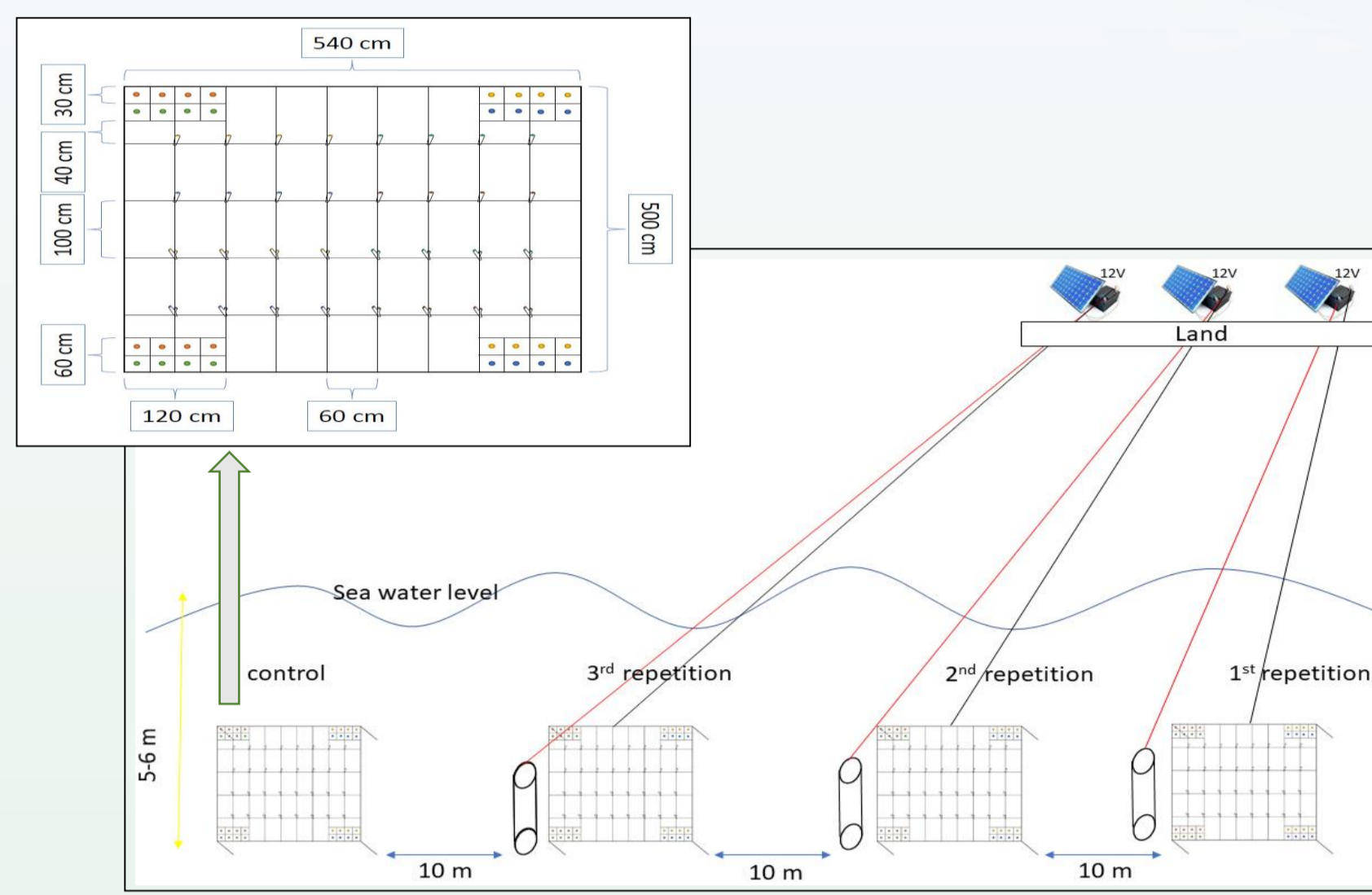
Coral reef conservation and restoration are undergoing dramatic growth. BioRock is one of the approaches have been successfully applied. BioRock method invented and developed by Prof. Wolf Hilbertz and Dr. Thomas J. Goreau has shown that it can generate calcium and magnesium minerals as a crystalline coating over artificial structures. BioRock is capable producing minerals by supplying a low voltage electrical current, which is commonly recognized as mineral accretion. Most researchers claimed a boost of growth rate of corals on BioRock were only measured the increment of branch length by using Vernier caliper to infer the coral growth rate which may not represent the actual growth rate.

In present study, we measured planar area (2 dimension) changes by ImageJ software and the survival rate of coral transplants by direct observation. Four species were chosen. Four colonies of each species were chosen, 16 fragments were taken from each colony. Sixty-four fragments comprised of 4 species were transplanted to 4 structures. All fragments will be photographed with a fix distance between lenses and coral fragment. We are collecting photos every four months throughout a year since August 2019. Two field trips have been conducted so far, the preliminary results as showed below.

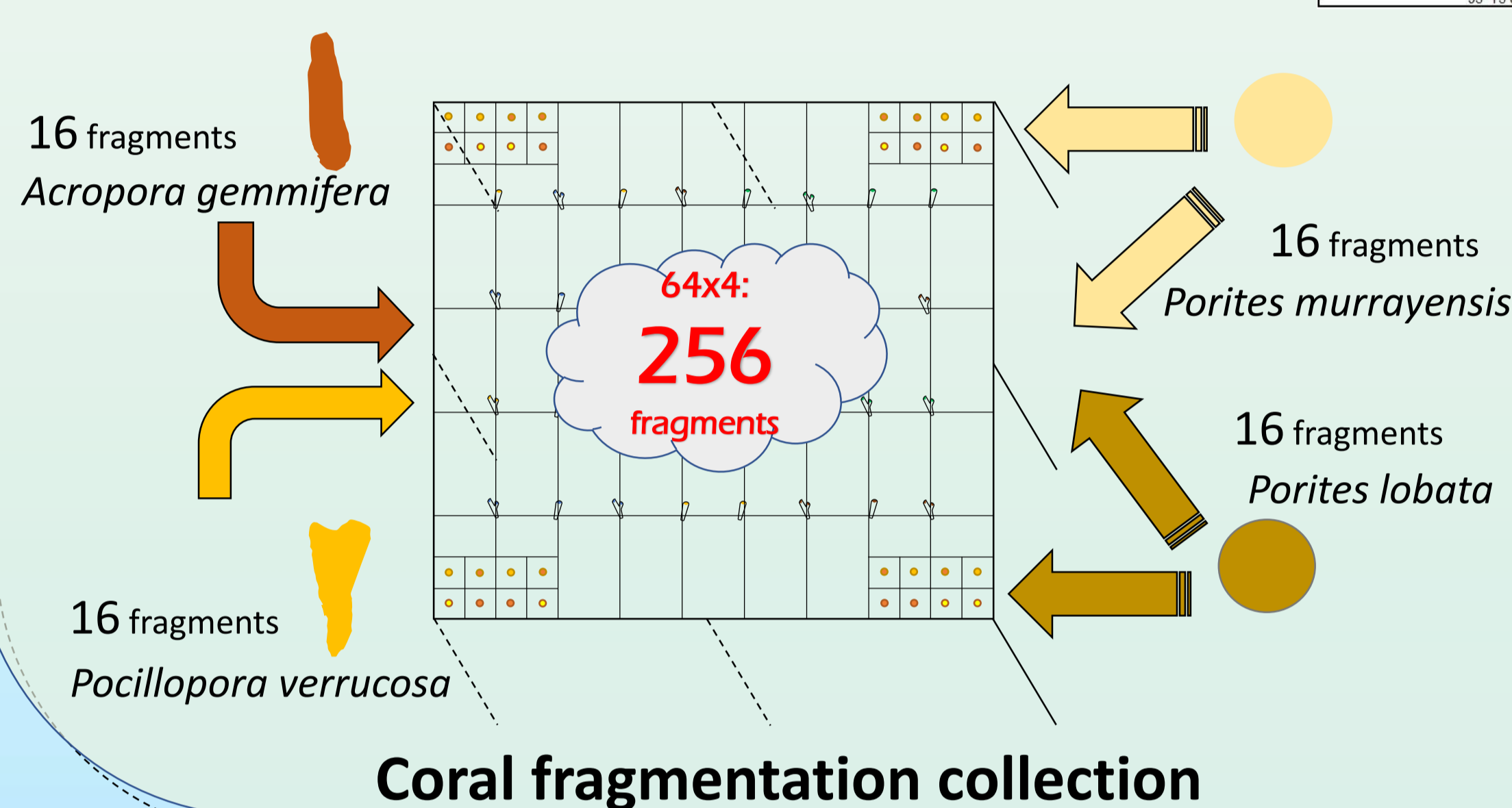
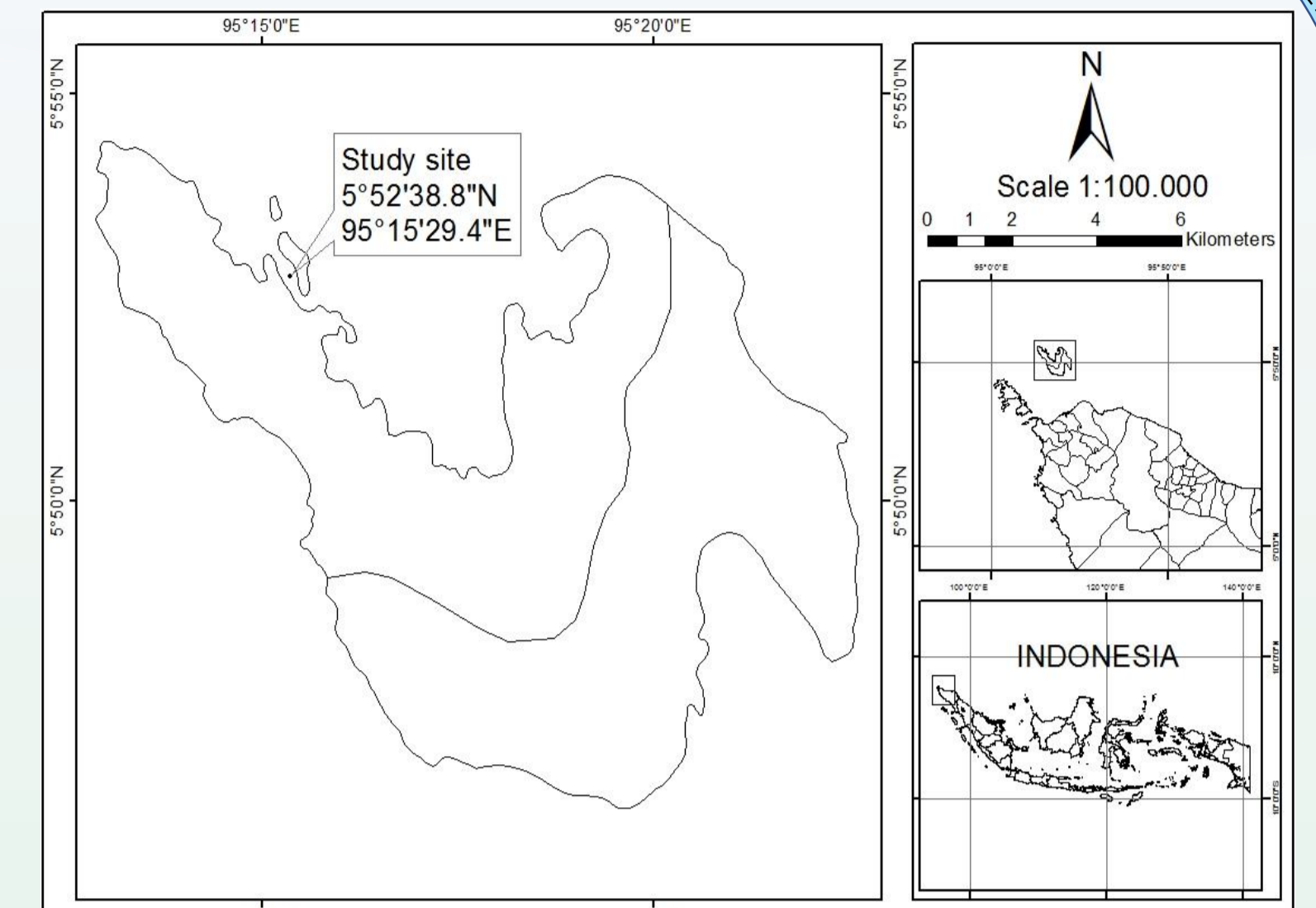
## Methods



### Structure used



### Research site



analyzed by ImageJ software

## Results

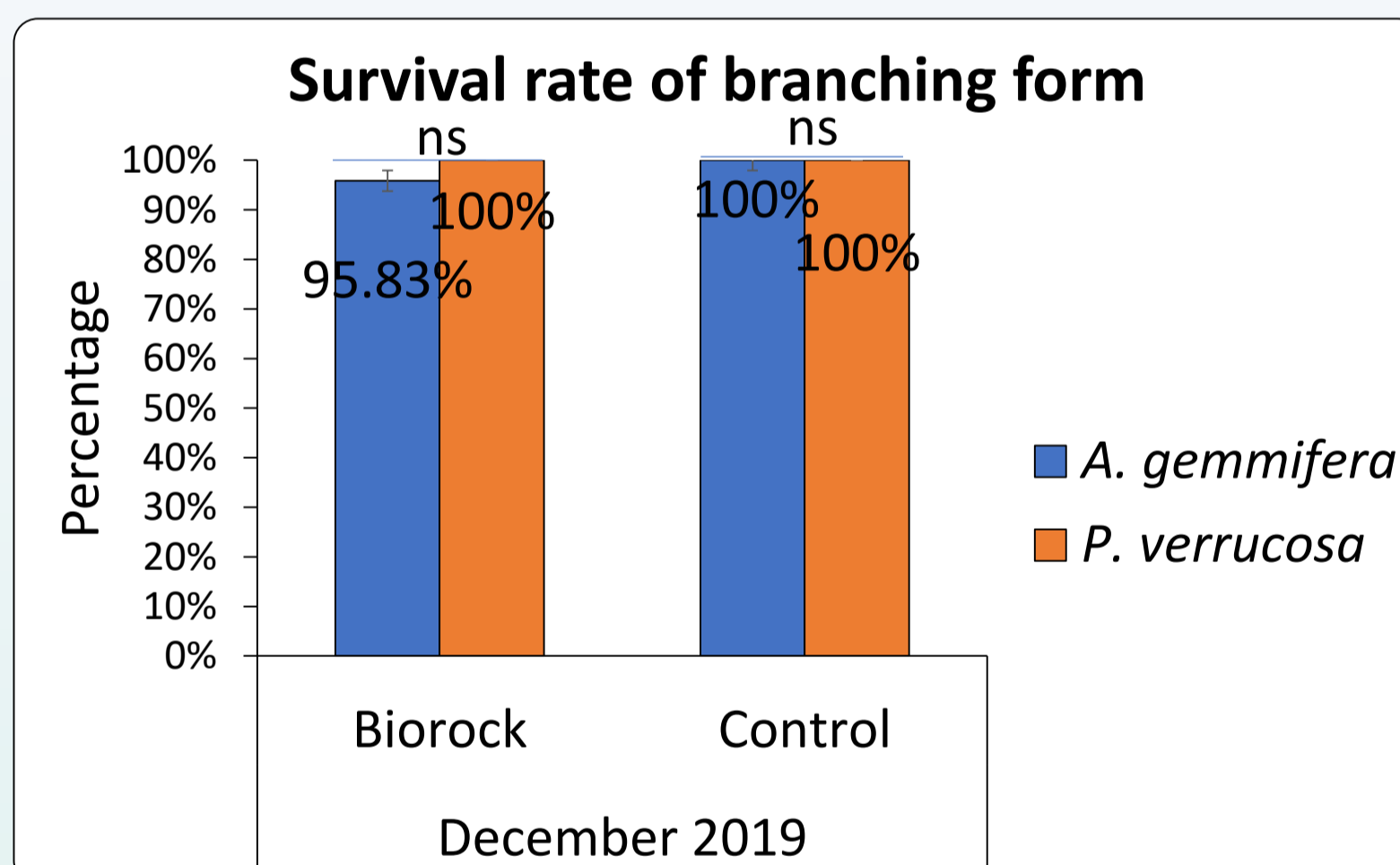
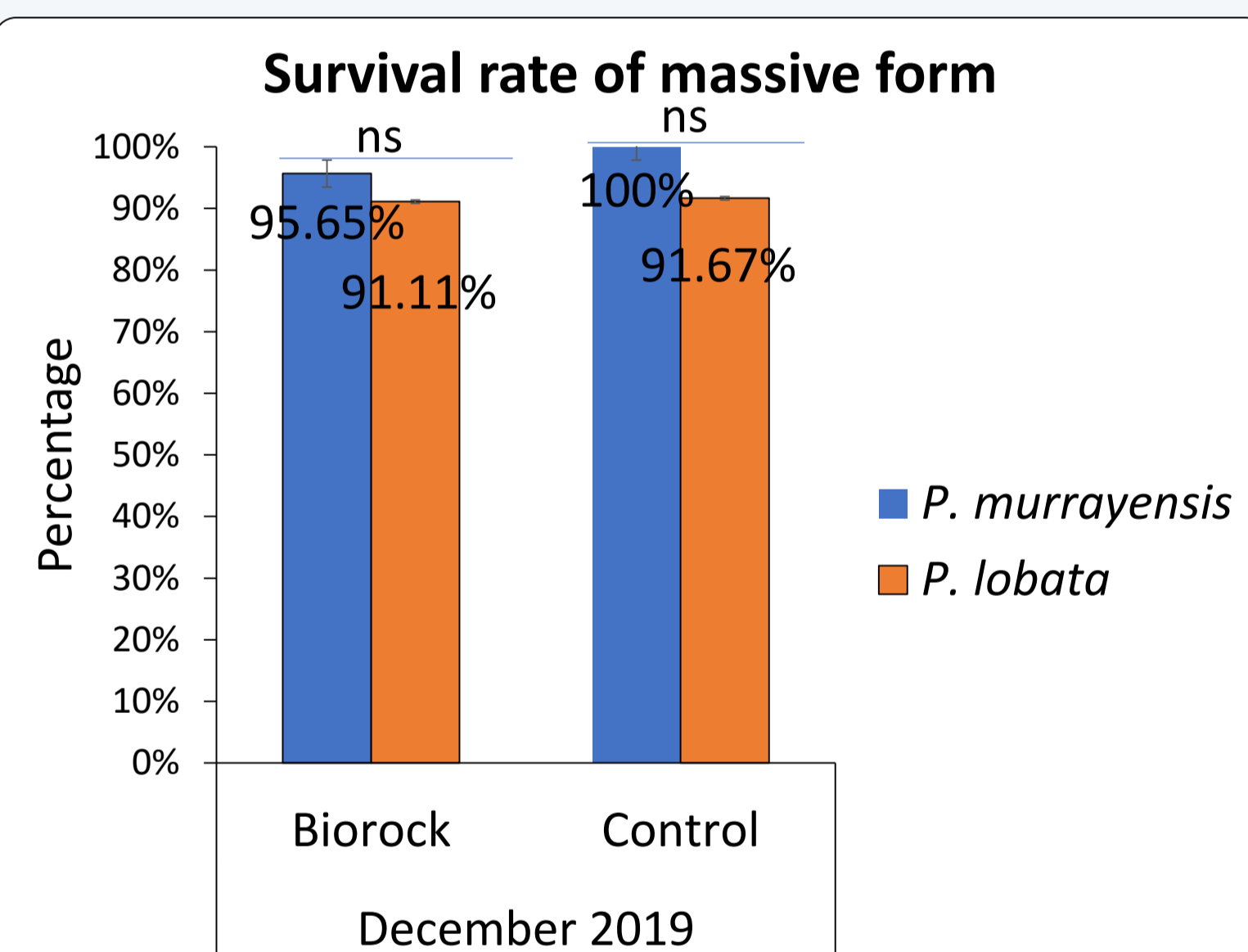


Figure 2.

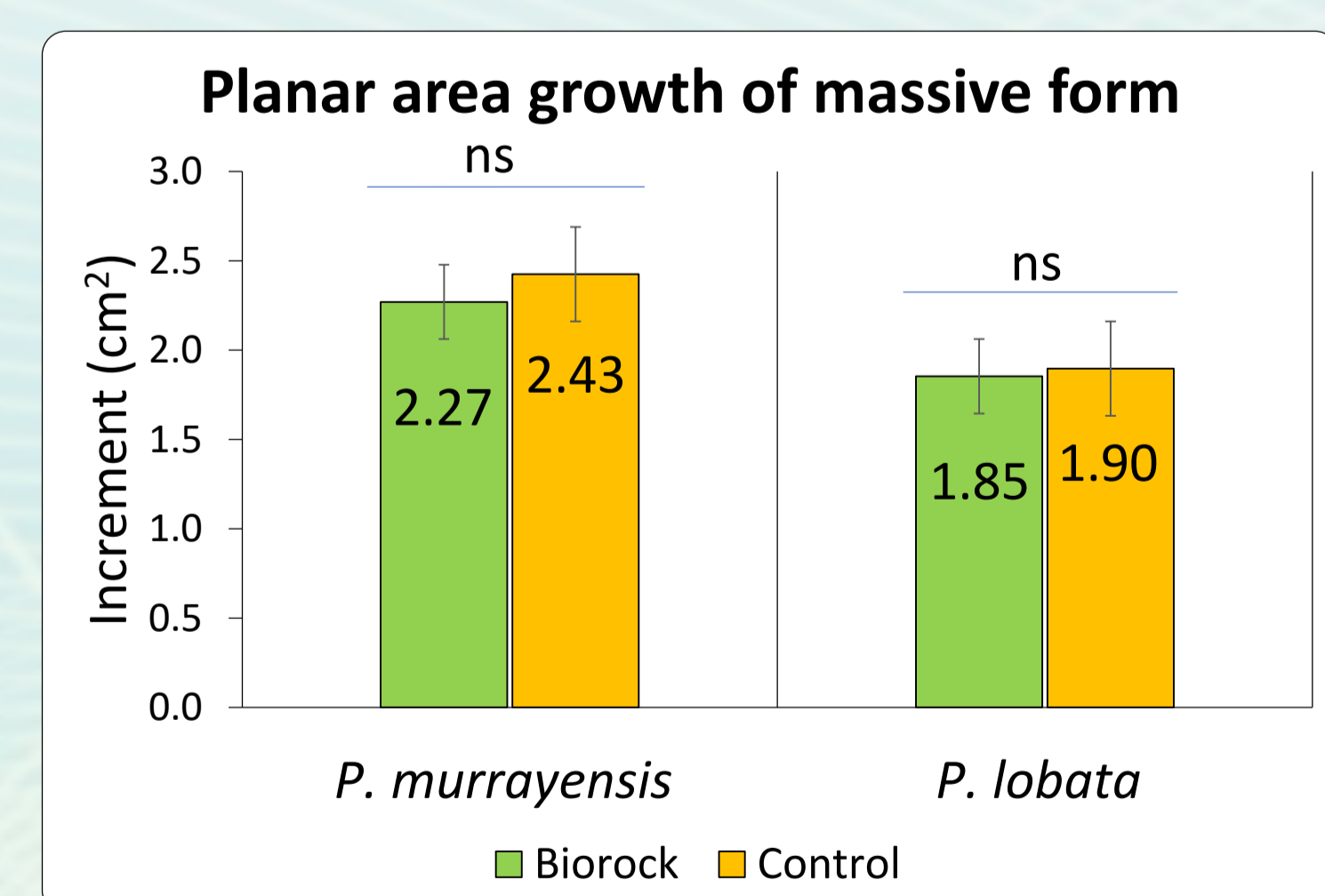


Figure 3.

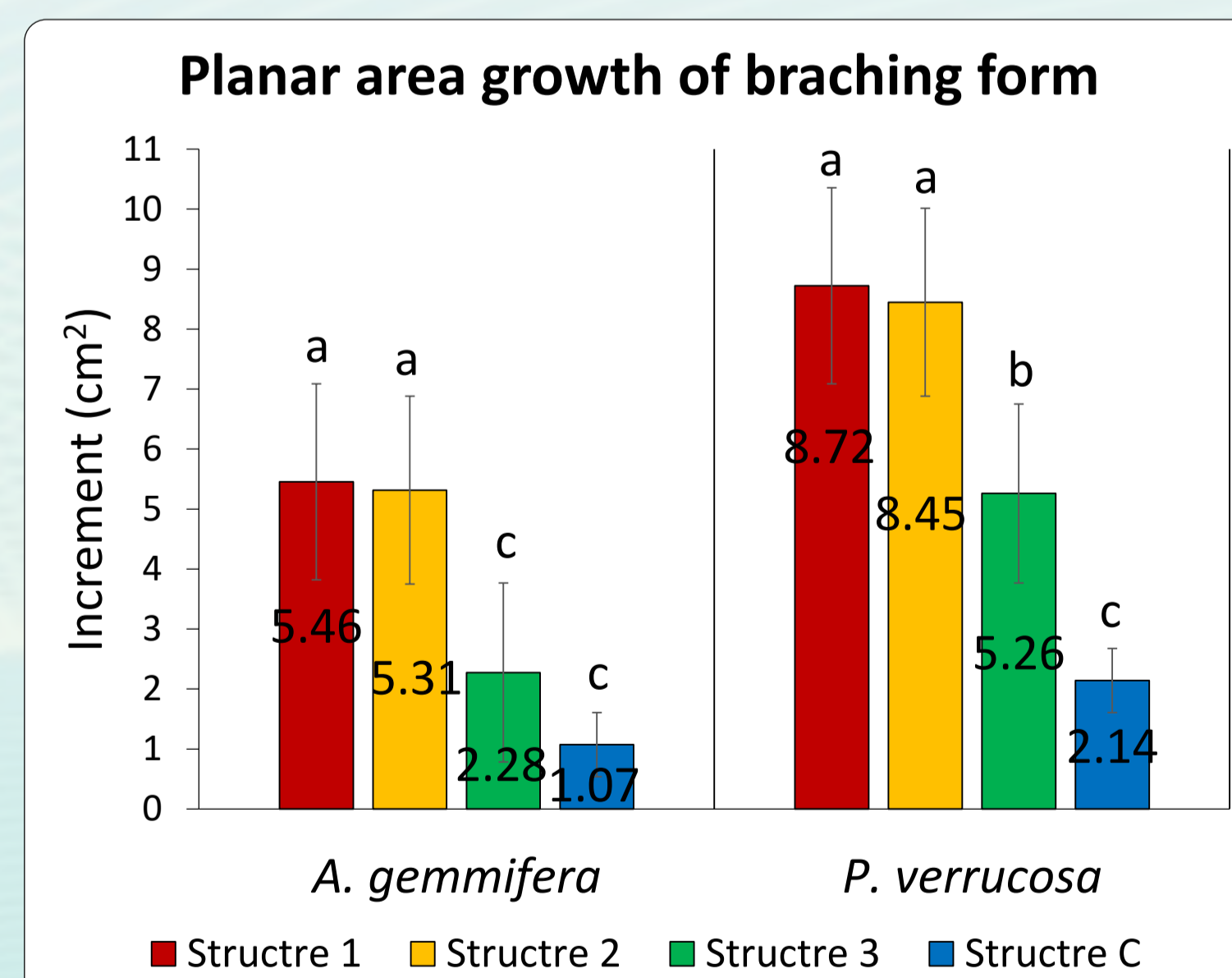


Figure 4.

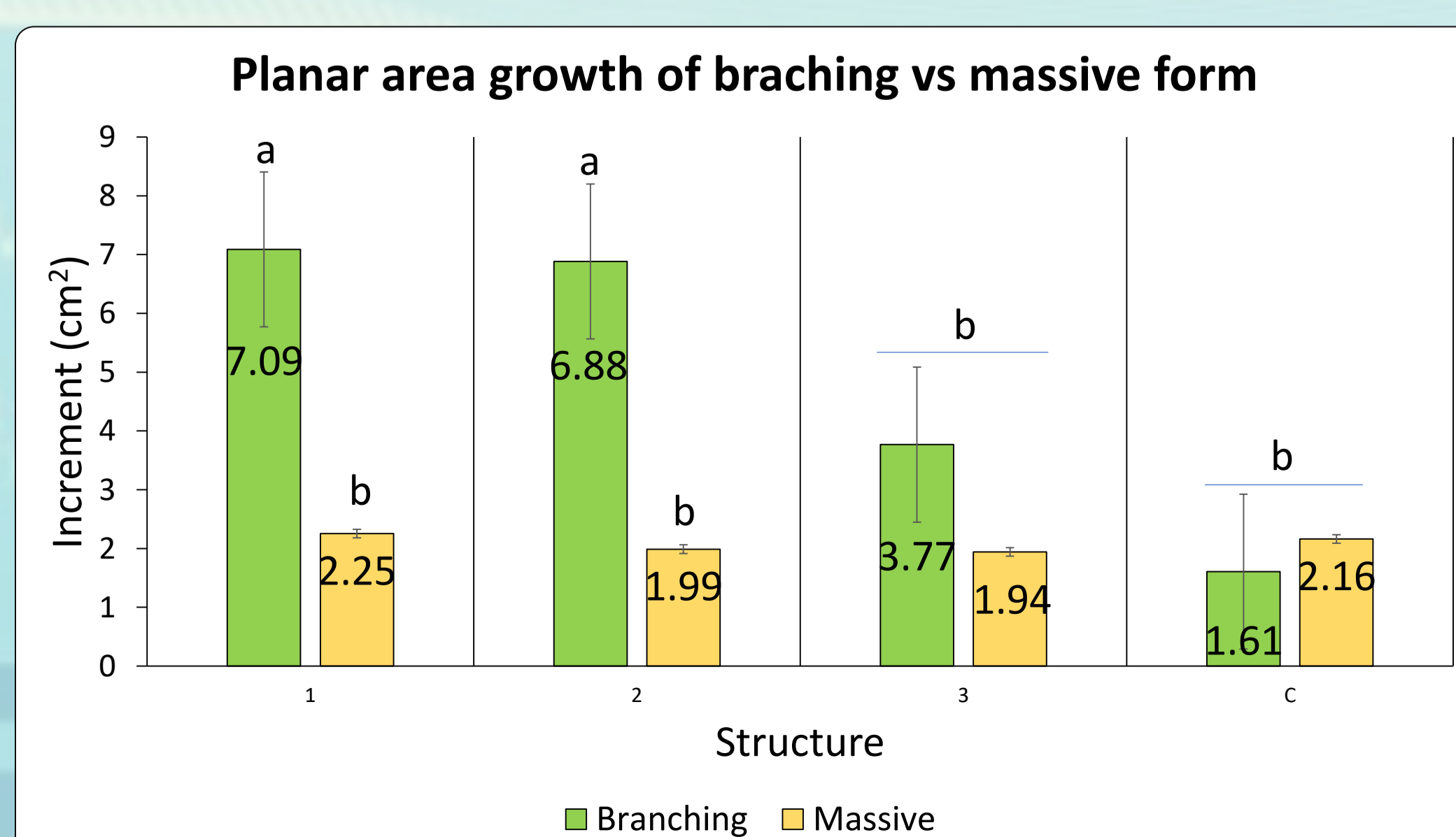
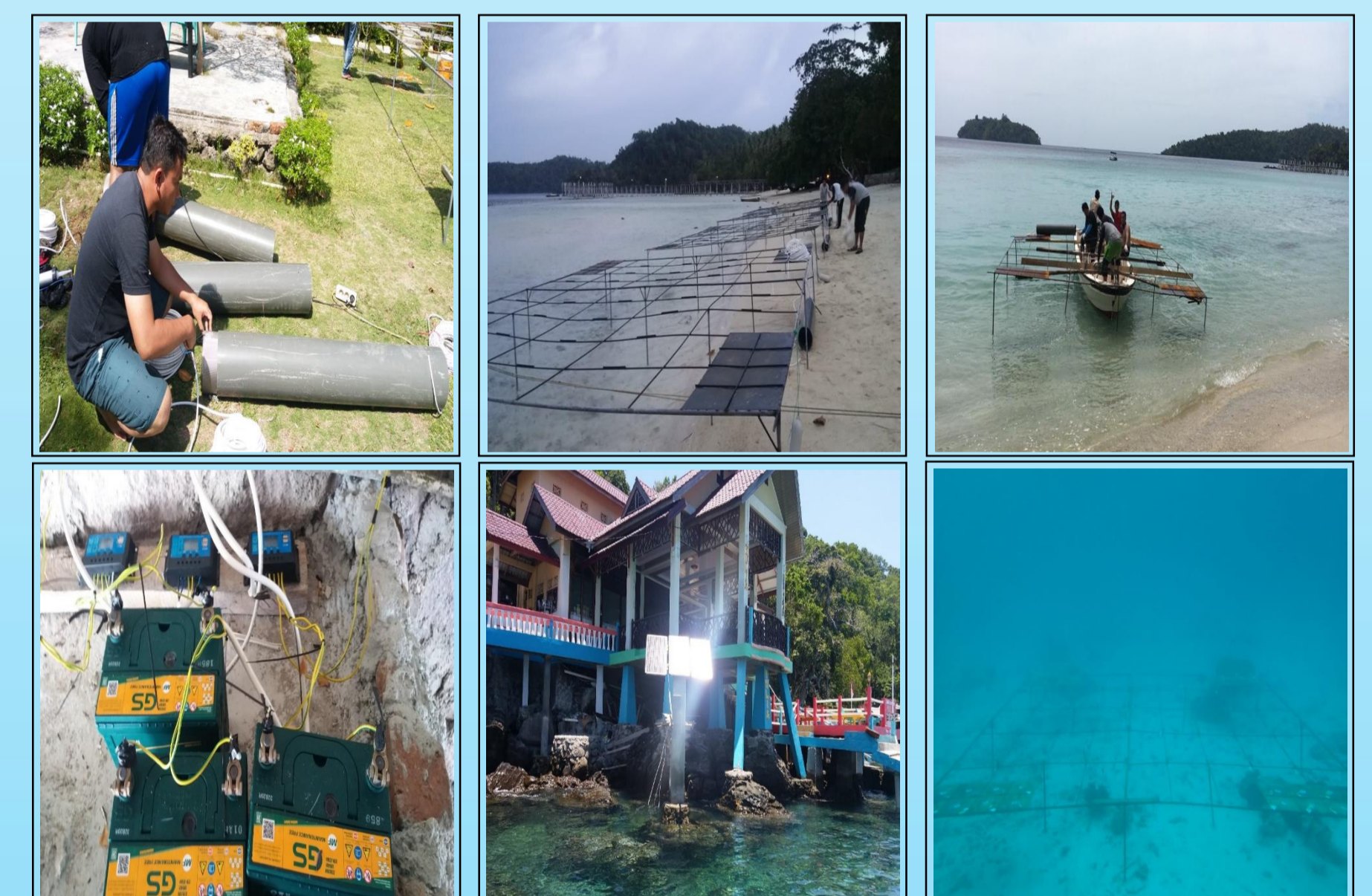


Figure 5.



Above photos were taken during BioRock assembling process

## Results

1. Survival rate of branching coral form (98.96%, Figure. 1) is higher than massive (94.61%, Figure. 2), there is no significant between two growth forms.
2. There is no significant different between BioRock and control for massive form with  $P$ -value  $>0.05$  (Figure. 3).
3. The growth of branching corals form with the electro-stimulation was significant higher than control with  $P$ -value  $<0.05$  (Figure 4).
4. The growth rate of branching form is significant higher than massive form on BioRock structures. Except control and one of the BioRock structure (Figure 5).



## Conclusion

BioRock and control showed a high survival rate for both coral form. Survival rate of branching coral form (98.96%, Fig. 1) is higher than massive (94.61%, Fig. 2), there is no significant between two growth forms. BioRock contributes more in term of growth rate for branching form than massive form.