

Comparison of three culture methods of red seaweed in coastal waters off northern Sri Lanka

B. Tharmini and M.D.S.T. de Croos*

Department of Aquaculture and Fisheries, Faculty of Livestock, Fisheries & Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka

Introduction

- Kappaphycus alvarezii*, which originally from Philippines, is economically important due to its high carrageenan content
- Despite regional reports on its biological invasiveness, attempts to introduce *K. alvarezii* to Sri Lanka might probably be due to its higher profit potentials.
- But suitable culture methods; solutions for fish grazing; and suitable culture sites have not yet been identified.

Aims

- To compare growth of *K. alvarezii* under different culture methods.
- To find a method to minimise fish grazing as it reduces the harvest and contributes for further spreading.

Experimental design and analysis

- Growth rates of *K. alvarezii* was tested under 3 culture methods, "raft"; "line"; and "cylinder-cage" culture (Fig. 1) at Velanai and Kayts in northern Sri Lanka, from April to August 2014.
- Around 60 seedlings, of a unit weight of 60-100g, were tightened into each raft and line, while inserted into cylinder-cages.
- In 3-day intervals, five randomly selected seedlings were weighted & replaced from "line" and "raft", while "cylinder-cage" was weighted as an entire unit, in determining the percentage growth rate (Yoong *et al.*, 2013) & weight lost.

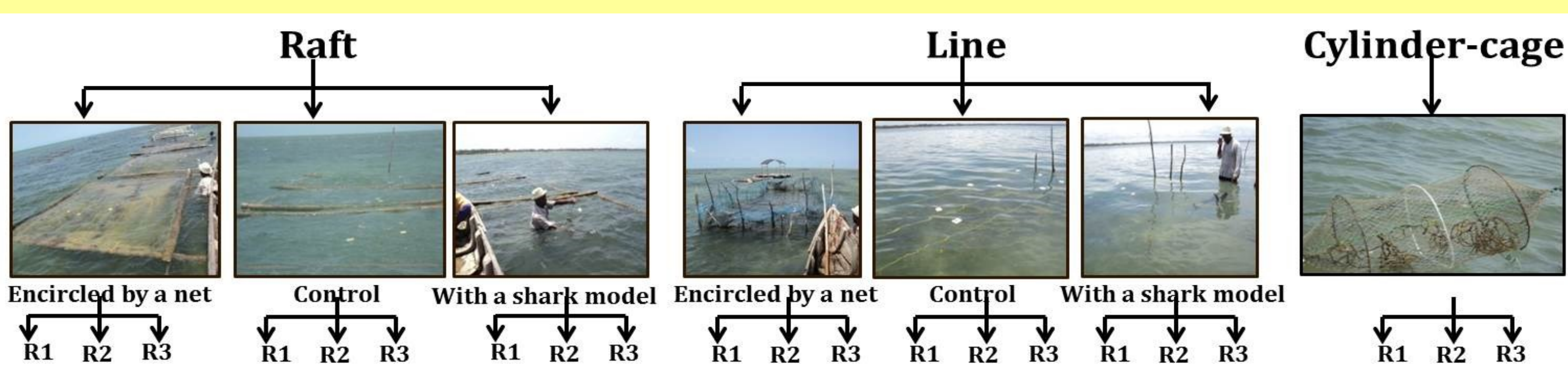


Figure 1: Experimental setup for testing growth rate of *K. alvarezii* under 3 culture methods, "raft"; "line"; and "cylinder-cage" culture. The "Raft" and "line" methods were tested with three combinations: completely encircling by a net; combining with shark models to scare fish; and control. As "cylinder-cage" culture is fully covered neither net-covering nor shark model were combined. Three replicates (R_{1,2&3}) were set for each of these combinations

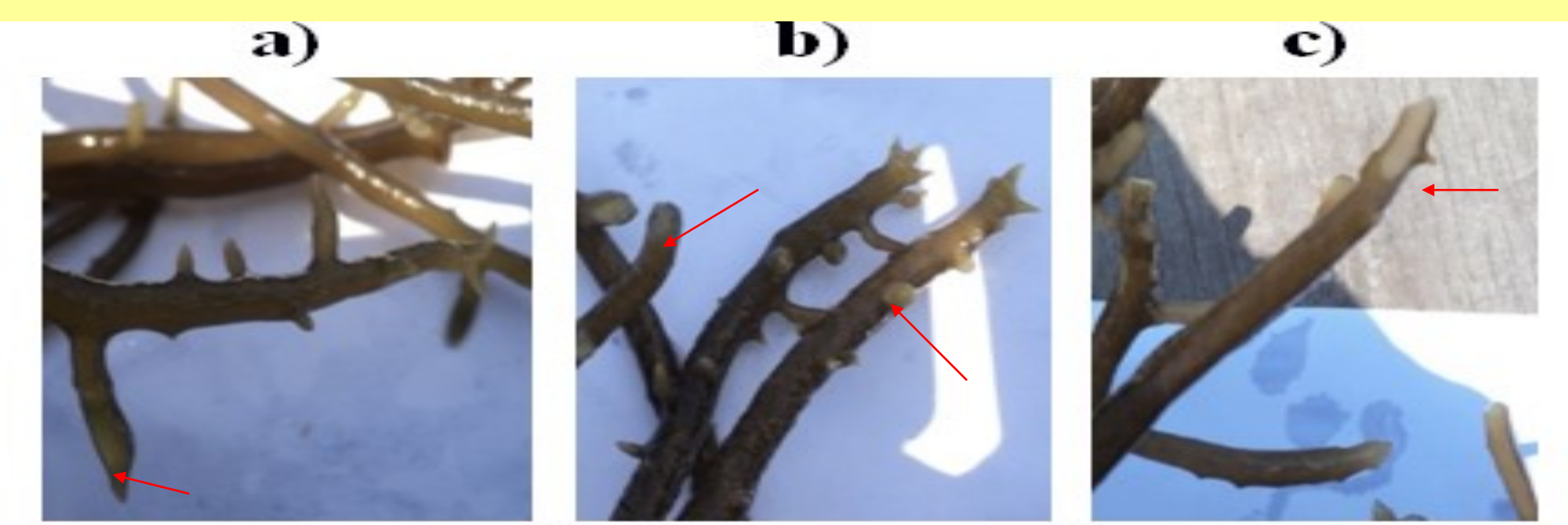


Plate 1: Characteristics considered in ranking the intensity of fish grazing a) all buds were intact; b) partially damaged plant, at least one bud remained and c) fully damaged no buds



Plate 2: Occurrence of ice-ice disease

Effect of raft & line culture methods

- Among both the line and raft methods, the encircled-net combination showed the highest dry-weight gain and limited-spreading of broken parts of the seaweed (Fig. 2).

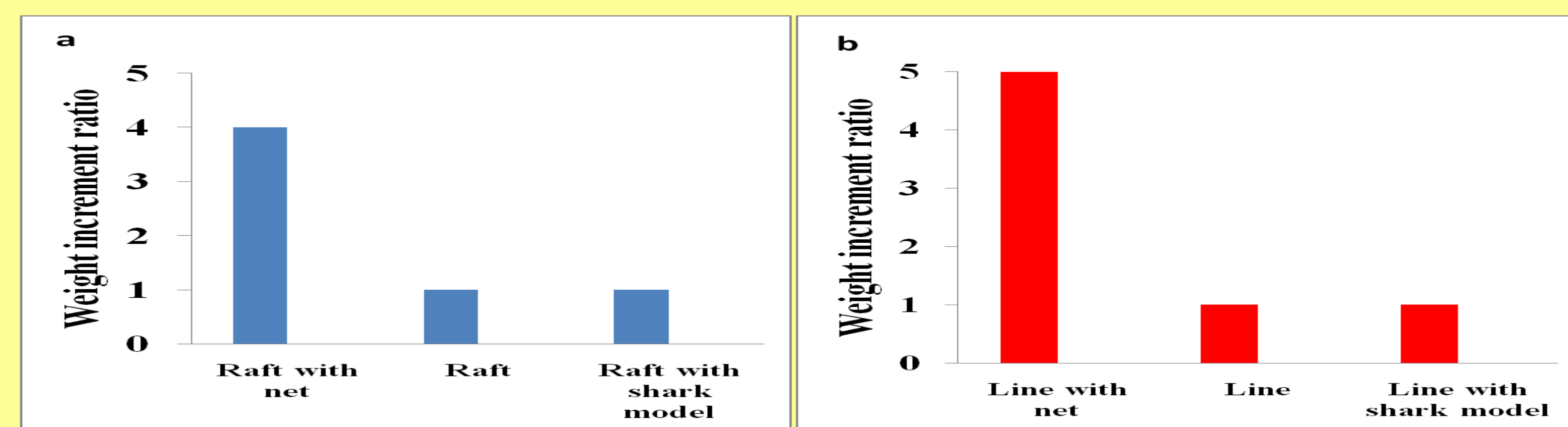


Figure 2: Dry-weight gain of *K. alvarezii*, under different combinations of "raft" (a) and "line" (b) culture methods

Effect of raft & line culture methods

- Among the three culture methods cylinder-nets resulted the highest growth rates (Fig. 3) of *K. alvarezii* & highest economic profits.
- Mechanically damaged seaweed parts were remaining inside the cylinder-net resulting zero weight lost and further spreading of broken parts.
- Cylinder-nets can frequently be cleaned to avoid clotting due to its smaller size.
- Growth rate of *K. alvarezii* was redundant after 40 days thus, harvesting is recommended ~40th day of culture cycle. At this stage reproductive structures were not reached to its maturity hence spreading due to sexual reproduction was minimum.

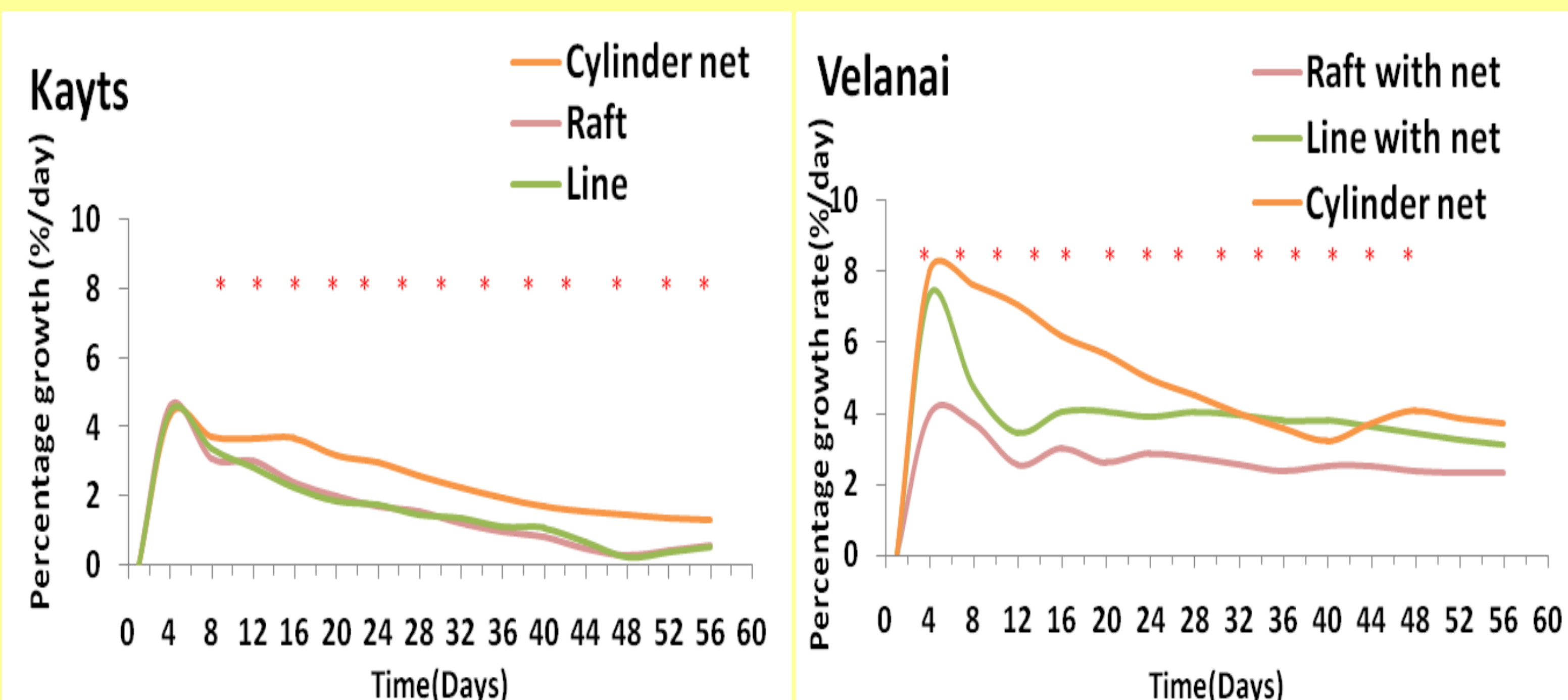


Figure 3: Percentage growth rate of *K. alvarezii* under three culture methods: "rafts"; "lines" & "cylinder-cage" at Kayts and Velanai sites. Significant daily growth rate differences ($P < 0.05$) among culture methods are marked with asterisks (*)

Weight lost due to grazing

- Weight lost due to grazing was zero in cylinder-cage, while less than 5% due to diseases.
- Shark model was not effective at the latter part of culture cycle as fish seems to get adapted to the model (Fig. 4) hence, a mobile shark model could be an alternative.

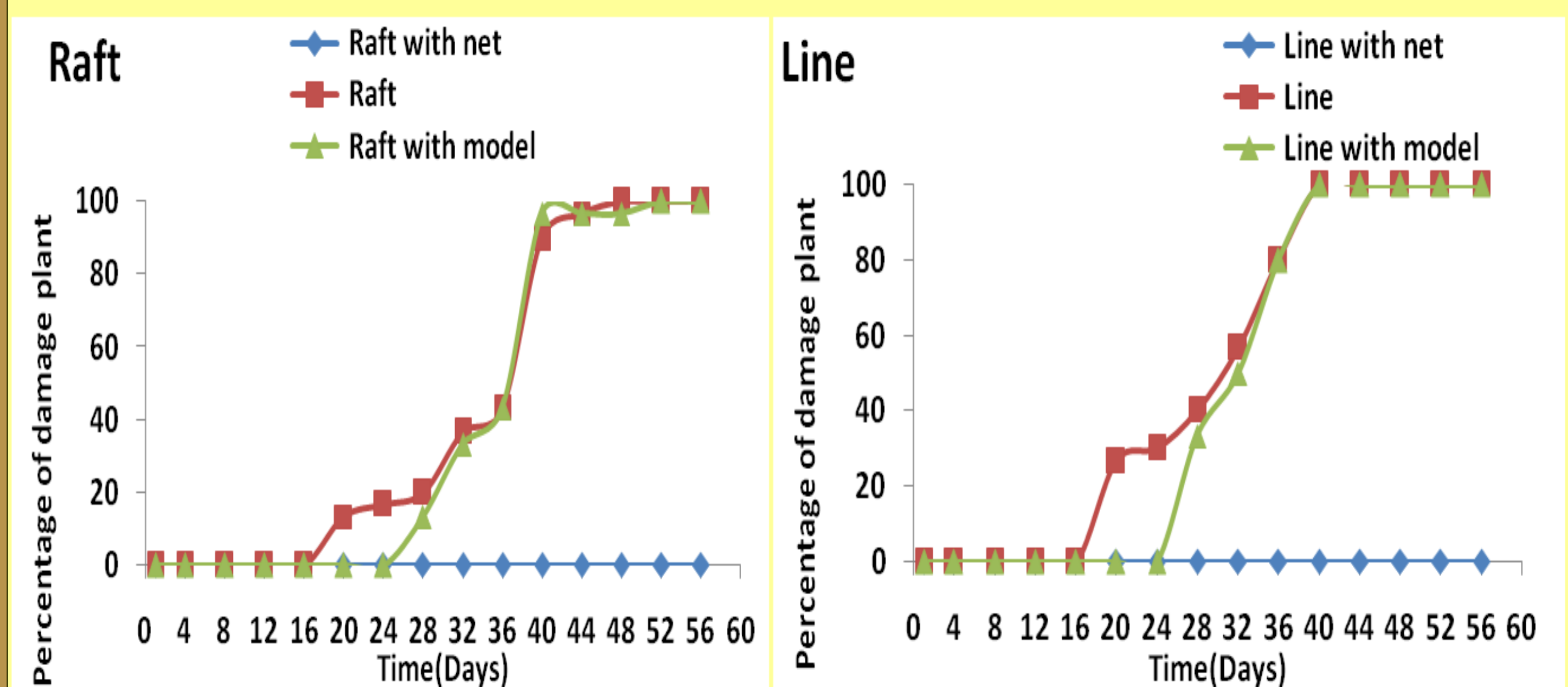


Figure 4: Percentage damage of *K. alvarezii* due to grazing activity under different culture combinations of rafts and lines

Conclusions

- Lines & rafts which covered with nets resulted the highest growth rate.
- Among all the methods, cylinder-cage resulted the best growth rate and highest economic returns.
- Environmental conditions at Velanai site seems to be the best for culturing seaweeds off Jaffna.
- A comprehensive study should be conducted in analyzing the associated environmental risks before popularizing *K. alvarezii*.

References

Yoong, SY, Wilson, T LY, & Ann, A (2013), *Journal of Applied Phycology* 25(2)

Acknowledgments

