Isolation Of Marine Sponge-associated Fungi From Bidong And Karah Islands

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1 INTRODUCTION

Sponges are the most prolific marine organisms with respect to their production of bioactive compounds with various range of biological properties.

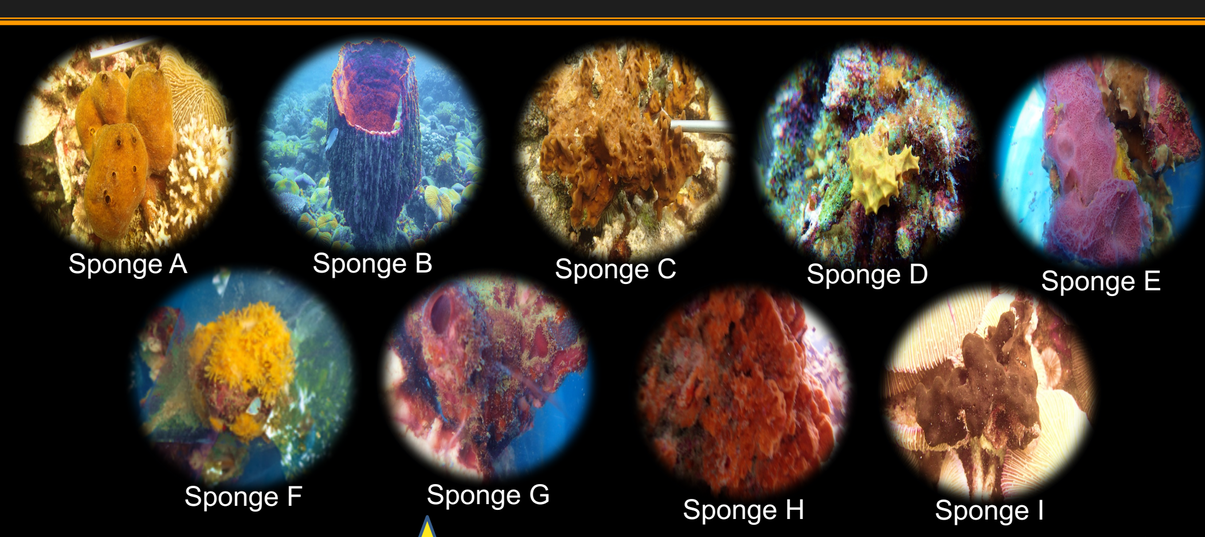
Previous study have shown that the majority of these compounds are not produced by the sponge itself, but rather by the associated-microorganisms (Indraningrat et al., 2016).

Prokaryotic microbial communities associated with sponges have well been studied whereas eukaryotic microbial, especially sponge-derived fungi have barely been addressed.

AIM:

to explore the fungal diversity of marine sponges from Bidong and Karah Islands, based on cultivation-dependent approach using various selective media to maximize the number of fungal isolates and directly screened their functional properties based on the ability of producing cellulase and halogenase.

2 METHODOLOGY



3 RESULTS

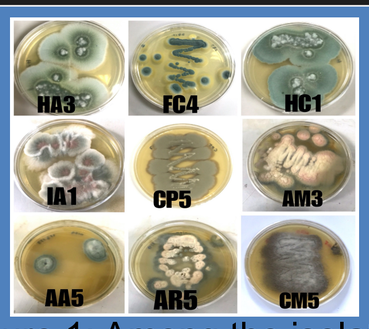


Figure 1: Among the isolated sponge-associated fungi on agar media.

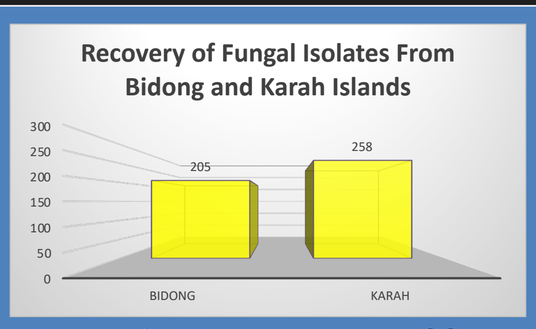


Figure 2: The recovery of fungal isolates from Bidong & Karah Islands.

Media / Sponge	PDA	MEA	MBR	MCL	MF	R2A	AC	AX	Total no. of fungal isolates
A (Aaptos aptos)	6	7	6	4	4	6	7	10	50
B (Xestospongia testudinaria)	10	8	3	4	2	9	12	16	64
C (Neopetrosia exigua)	6	5	4	3	6	7	7	8	46
D (Unknown, Yellow sponge)	7	6	7	5	3	3	9	5	45
E (Unknown, Purple sponges)	5	6	7	9	9	9	9	6	60
F (Acanthella cavernosa)	9	7	8	6	4	7	6	3	50
G (Theonella swinhoei)	6	7	8	6	6	7	7	7	54
H (Unknown, Orange sponges)	8	5	8	8	4	5	4	4	46
I (Unknown, Black sponge)	6	7	6	6	5	5	7	6	48

Table 1: The number of fungi isolates on each sponges and media

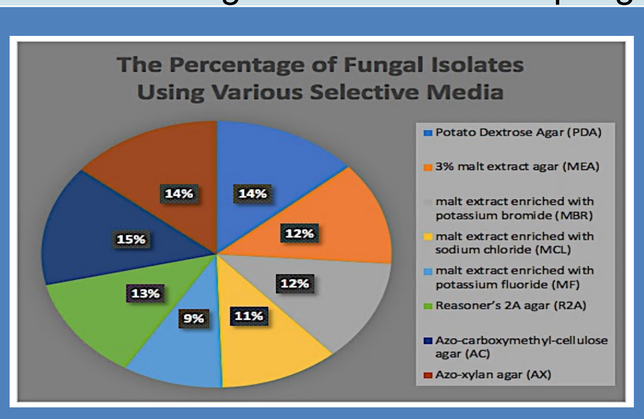


Figure 3: The Percentage of fungal isolates using various selective media

4 DISCUSSION

A total of 463 growing fungal colonies were isolated from nine different species of sponges (**Figure 2**). The presence of relatively large populations of fungal in the sponge samples of Bidong and Karah Islands indicate that the source is an eminently suitable ecosystem.

Based on the similar morphologies, there were 4 different species of sponges were collected from Bidong island while another 5 different sponge species were collected from Karah island.

The highest numbers of fungal isolates were obtained from Sponge B (Xestospongia testudinaria), with 16 isolates were isolated from Azo-xylan agar (**Table 1**). Previous studies showed that many symbiotic fungi from Xestospongia testudinaria could produce secondary metabolites that had cytotoxic (El-Gamal et. al,2016) and antimicrobial activity (Li et.al, 2012).

However, to the best of our knowledge, this study is the first report on pre-screening of xylanase production by fungi associated with Xestospongia testudinaria sponge. Thus, these isolates may contribute to the need to discover a new source for novel enzymes.

8 media were applied to assess the optimal conditions for the isolation of sponge-associated fungi and directly screened their functional properties based on the ability of producing cellulase and halogenase. Potato dextrose agar and MEA were the common media used to grow fungi, MBr, MCl, MF and R2A agar were designed to detect halogenase production, while AC and AX agar were used to pre-screened the production of cellulase.

As shown in **Figure 3**, Azo-carboxymethyl-cellulose agar showed the highest percentage of fungal isolates recovery (15%) while malt extract enriched with potassium fluoride showed the lowest percentage for the fungal recovery (9%).

The growth of fungi on different agar with different substrates indicated that they might produce a wide range of degrading enzymes (Wang et. al, 2016). The results confirmed that sponge-associated fungi could be a good source of cellulase and halogenase enzymes, which may become more widely available as these are being as a source of biomass for biorefineries and pharmacological activities.

5 CONCLUSION & FUTURE WORK

In conclusion, symbiotic fungi from sponges collected from Bidong and Karah islands clearly could produce a wide range of hydrolytic activities.

More in depth study of the enzymes from sponge-associated fungi, is needed to identify novel activities and enzymes with novel properties and to enhance our understanding on the sponge-eukaryotic relationships.

For the time being, the true nature of sponge-fungal associations remains obscure and far more research needs to be devoted to this field.

6 REFERENCES

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