

Marine fungal research in India – present status and future prospects

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ABSTRACT:

India has a vast coastline of more than 5700 km covering east and west coasts in a peninsula. Marine fungi, in the past, were reported to be predominant on drift wood but subsequently the mangrove substrata are found to be either equal or more in diversity than the drift wood. Mangrove formations could be found in several sites along both coasts in India. In the past 50 years considerable research has been undertaken on marine fungal diversity. More than 400 marine fungi have been reported from India of which 340 are reported from mangrove habitats. West coast has been reported to be more diverse for marine fungi than east coast. Around 44 new marine fungal species have been introduced from India. Several mangrove formations on west and east coasts have been surveyed. However, large mangrove formations of Gujarat, west coast and Odissa, West Bengal (Sunderbans) and Andaman and Nicobar Islands on the east coast are yet to be explored for marine fungi. Diversity studies of marine fungi were predominantly carried out in India, while one institute has concentrated on physiology and biotechnology of marine fungi. Also ecological observations such as (a) Host and substrate recurrence, (ii) frequency of occurrence, (iii) vertical distribution, (iv) seasonal occurrence, (v) litter bag studies for loss of biomass were also made. *Rhizophora* spp. and *Avicennia* spp. supported a large number of marine fungi which is in conformity with mangroves around the globe. *Verruculina enalia* has been the most frequently recorded marine fungus from India followed by *Halocryptosphaeria bathurstensis*, *Cryptosphaeria mangrovei*, *Sclerococcum haliotrephum*, *Rimora mangrovei*, *Aigialus grandis*, *Lulworthia* sp., *Leptosphaeria australiensis*. Some differences in the diversity of frequently recorded marine fungi between the east and west coasts and between the two main host genera were recorded. It has been found that woody substrata of *Avicennia* spp. and prop roots of *Rhizophora* spp. supported a large number of fungi when compared to roots, pneumatophores or seedlings. Raghukumar and others at NIO, Goa reported deep sea fungi from Central Indian Ocean Basin and Arabian Sea including phylogenetic diversity of culturable and culture-independent fungi in addition to studying the barotolerance of deep-sea fungi. Further the same group also contributed a lot on the physiological and biotechnological aspects of marine fungi including the production of PUFAs and extra cellular polysaccharides by thraustochytrids, production of xylanases and lignin degrading enzymes by marine fungi and their efficacy in the treatment of coloured effluents and synthetic dyes, biobleaching of paper pulp. Also, this group investigated the deep-sea fungi to be a source of alkaline and cold-tolerant proteases. The following institutes were found to be the main centres of marine fungal research in India including National Institute of Oceanography (NIO), Goa India, S.P. Pune University, Maharashtra and University of Calicut, Kerala from west coast of India and University of Madras and Pondicherry University, Pondicherry from west coast of India. While most of these centres have concentrated on marine fungal diversity from coastal regions, NIO has also studied marine fungal diversity in the deep sea in addition to the physiological and biotechnological studies. Many of the researchers working on marine fungi from the above institutes have retired or have shifted their focus from diversity studies to other topics and hence there is no continuation of marine fungal diversity research from some of the institutes. However, there is a necessity to encourage to contribute on marine fungal diversity studies as large tracts of mangrove forests in Gujarat, Odissa and West Bengal states and Andaman and Nicobar Islands of India have largely remained unexplored. The advent of molecular taxonomy has also caught the attention of marine fungal researchers in India and the same has given

supporting evidence for the introduction of several new species in recent times. The same trend should continue as such efforts would help in the identification of taxa when culture-independent studies are undertaken. The enzymatic studies and applied aspects of marine fungi including the bioremediation and screening for secondary metabolites of therapeutic use are still in their infancy and need to be intensified. The metagenomic studies for marine fungal diversity analysis and drug discovery have to be taken up for future studies in India in a concerted way.