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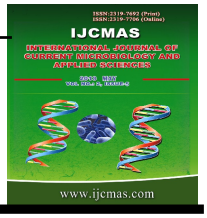

Original Research Article

Isolation and screening of degrading enzymes from mangrove derived fungi

M. Prakash and T. Sivakumar*

Department of Microbiology, Kanchi Shri Krishna College of arts and Science, Kilambi, Kancheepuram - 631 551, Tamilnadu, India
**Corresponding author e-mail: shiva_fungi@rediffmail.com*

Keywords

Mangroves; Marine fungi; baiting technique; Enzyme assay;

A B S T R A C T

Mangrove habitat of Muthupet was selected in the present study. Water, sediment, sea foams and natural substrates were collected to isolate the fungi by plating, baiting and direct examination techniques. Screening and activity of fungal enzymes like pectate lyase, lipase, xylanase and lipase were studied.18 species of fungi were showed zone of clearance for laccase followed by xylanase (16 sp.), lipase (13 sp.) and pectate lyase (12 sp.). Maximum enzyme laccase activity was observed in *R. stolonifer* (0.173 U/ml), xylanase in *A. flavus* (5.805 U/ml), lipase in *Mucor* sp. 2.982 U/ml) and pectate lyase in *R. oryzae* (11.529 U/ml).

Introduction

Fungi are eukaryotic, spore producing, acholorophyllous, heterotrophic organisms with absorptive nutrition that generally reproduce sexually and asexually. They secrete digestive enzymes outside their bodies and absorb the nutrients. They also produce valuable source of chemicals, antibiotics and enzymes.

The majority of manglicolous fungi are omnivorus and occur mostly on dead cellulosic substrates all around the tropics. Many important industrial products are now produced from fungi using fermentation technology. A wide range of enzymes are excreted by fungi and play an important role in the breakdown of organic materials and many of these enzymes now produced commercially. Qualitative screening of degrading enzymes in marine fungi was reported by Rohrmann and Molitoris (1992). The number of authors are investigated enzyme production especially pectate lyase (Raghukumar *et al*., 1994); Lipase (Yadav *et al*., 1997, Kamini *et al*., 1997); Xylanase (Nilsson, 1974) and Laccase (Safari *et al*., 1999). In the present study, 35 species of fungi were isolated from Muthupet mangrove ecosystem and screened for enzymes production.

Materials and Methods

The study area comprises a stretch of 6km in the Muthupet mangroves up to its tail end. Totally, five sampling stations were selected. They are Koraiyar(S1) Korimunai (S2), Manakkattu (S3), Lagoon (S4) and Kadalmunai (S5). Water,

sediment, sea foams and natural substrates of mangrove plants were collected to isolate the fungi. After sampling, the samples were subjected to agar plating technique using PDA, CZA, CMA and RBA with addition of mixture antibiotics. The plates were incubated at room temperature (28ºC) for 4-5 days. The semi permanent slides of the isolated fungi were prepared using Lactophenol Cotton Blue staining technique (Dring, 1976) and sealed with DPX mountant. The identification of fungal taxa was based on Hyphomycetes (Subramanian, 1971), Dematiaceous Hyphomycetes (Ellis, 1971) and A manual of soil fungi (Gilman, 1998). In this fungal enzyme studies, total of 35 species of fungi (most dominant) were selected and screened for the production of enzymes (Pectate lyase, lipase, xylanase and laccase).

Assay for Pectate lyase was studied according to Collmer *et al*., (1988). Assay for Lipase was done with method of Safarik, (1999). Assay for xylanase was studied according to Nanmori *et al*. (1990). Laccase activity was assessed by method of Ruttimann *et al*., (1992).

Results and Discussion

Totally, 200 species of fungi were isolated and enumerated from all the five sampling stations by plating, baiting and direct observation techniques. Among these, maximum fungal diversity was observed in Manakattu (S3) with represented by 90 species and least at S5 with 70 species. From the mangrove samples, maximum fungal diversity was observed in sediment samples with 128 species. Among the fungal isolates, *Aspergillus* was the common genus represented by 39 followed by *Alternaria, Curvularia* and *Penicillium.*

Among the fungal isolates, 35 species were most dominant and selected for enzyme studies. In this study, 18 species of fungi were showed zone of clearance for laccase followed by xylanase (16 sp.), lipase (13 sp.) and pectate lyase (12 sp.)

Laccase activity was observed in maximum in *Rhizopus stolonifer* (0.173 U/ml) and minimum activity was observed in *Aspergillus oryzae* (0.010 U/ml). It was well accepted with earlier reports of lignin is an amorphous high molecular – mass composed of phenylpropane subunits interconnected by variety of non – hydrolysable bonds. The relatively few groups of microorganisms that can degrade the macromolecule. The most efficient degraders are the white rot fungi (Safari Sinegani *et al*., 1999)

Maximum xylanase activity was observed in *Aspergillus flavus* with 5.805 U/ml followed by *A. versicolor* (5.424 U/ml), *A. funiculosis* (5.125 U/ml), *A. clavatus* (5.232). The minimum enzyme activity was observed in *A. koningi* with 2.612 U/ml. This results was correlated with previous studies of most microbial hemicellulolytic system contain beta xylosidase, which has been purified and characterized from many fungi *Aspergillus niger* (Rodonova *et al*., 1983), *A. fumigatus* (Kitpreechavanich *et al*., 1986 Sivakumar and Ravikumar, 2006).

Lipase activity was maximum observed in *Mucor* sp. with 2.982 U/ml followed by R. nigricans (2.440 U/ml) and *R. oryzae* (1.67 U/ml) and minimum activity was observed in *A. variecolor* with 0.341 U/ml and *F. semitectum* with 0.482 U/ml. The result was accepted with studies of Lazer and Schroder (1992) investigated fungal lipases, which degrade lipids from palm

oil. Prabhakar *et al.,* (2002) reported the effect of cultural conditions on the production of lipase by Fungi. Maximum pectate lyase activity was recorded in *R. oryzae* (11.529 U/ml), *A. niger* (3.355 U/ml), *A. conicus* (3.019 U/ml) and minimum of *A. oryzae* with 0.695 U/ml.

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