ABSTRACT

Mushrooms have been important to millions of people not only as food but as traditional medicine. They now serve as new sources for pharmaceuticals and nutriceuticals. For centuries the medicinal or tonic values of certain mushrooms have been known. Through modern research, more and more mushrooms are being identified and tested of their beneficial compounds.

The antifungal activities of the methanolic extracts of 15 selected polypores including *Pycnoporus* sp., *Polyporus* sp., *Microporus* sp., *Albatrellus* sp., *Trametes* sp., *Microporus xanthopus* and *Polypore* sp. against *Saccharomycetes pombe*, *Candida albicans*, *Candida parapsilopsis*, *Fusarium oxysporum* f.sp. *cubense* race 1, *Fusarium oxysporum* f.sp. *cubense* race 2, *Fusarium oxysporum* f.sp. *cubense* race 4 and *Ganoderma boninense* were investigated. The strains of polypores were obtained from the Fungal Biotechnology Laboratory, University Malaya. Culture systems (solid agar culture, submerged liquid culture, static liquid culture, effect of culture medium and solid substrate fermentation) in different culture media (potato dextrose, yeast – peptone – glucose, sabouraud dextrose , glucose – yeast – malt – peptone , malt extract and corn meal) were investigated to obtain the bioactive compounds.

Of the 15 strains studied, only *Albatrellus* sp. (KUM 60500) which was cultured on potato dextrose agar displayed high activity against *S. pombe* and *F. oxysporum* in the paper disc assay. The remaining 14 species did not exhibit activity except for extract of *Microporus* sp. (POR 18) inhibited *G. boninense*. The methanolic extracts of *Albatrellus* sp. and POR58 from static culture, using potato dextrose inhibited *F. oxysporum* f.sp. *cubense* race 4 but not *S. pombe*.

The production of oxidases and peroxidases by polypore fungi were examined with plate screening tests for tyrosinase, laccase and lignin peroxidase. Lignin peroxidase was detected in 12 of 15 polypores studied but was only high activity for *Trametes versicolor* (POR 33D), *Polypore* sp. (POR 35), *Pycnoporus* sp. (POR11) and POR 36. The laccase activity was strong for *T. versicolor* (POR 33D) and POR 58. On the other hand, *M. xanthopus* (POR 57) and POR 48 produced the tyrosinase in PDA plate cultures. POR 33D

and POR 35 showed the presence of lignin peroxidase activity of 6.146 U / mL and 8.148 U / mL respectively in submerged cultivation.

ABSTRAK

Cendawan bukan sahaja penting sebagai makanan tetapi juga digunakan sebagai perubatan tradisional. Cendawan merupakan satu sumber baru dalam perkembangan bidang farmaseutikal dan nutriseutikal. Penggunaan perubatan daripada cendawan telah diketahui sejak berabad yang lalu. Melalui penyelidikan terkini, lebih banyak cendawan telah dikenalpasti dan faedahnya telah juga dikaji.

Ekstrak metanolik daripada 15 polypores yang terpilih telah digunakan untuk ujian aktiviti anti-kulat. Polypores yang dipilih termasuk *Pycnoporus* sp., *Polyporus* sp., *Microporus* sp., *Albatrellus* sp., *Trametes* sp., *Microporus xanthopus* dan *Polypore* sp. telah diuji kebolehannya untuk menyekat pertumbuhan kulat seperti *Saccharomycetes pombe* , *Candida albicans* , *Candida parapsilopsis* , *Fusarium oxysporum* f.sp. *cubense* race 1, *Fusarium oxysporum* f.sp. *cubense* race 2, *Fusarium oxysporum* f.sp. *cubense* race 4 dan *Ganoderma boninense.* Polypores didapati daripada Makmal Fungal Bioteknologi, Universiti Malaya. Pelbagai jenis sistem kultur ('solid agar culture', 'submerged liquid culture', 'static liquid culture', 'effect of culture medium' dan 'solid substrate fermentation') dalam media yang berlainan (dekstros kentang, yis-peptone-glukosa, 'Sabouraud dextrose' , glukosa-yis-malta-pepton , ekstrak malta dan emping jagung) telah dijalankan untuk mendapat bahan bioaktifnya.

Daripada 15 polypores yang diuji, hanya *Albatrellus* sp. (KUM 60500) yang kultur di atas 'potato dextrose agar' dapat mempamerkan aktiviti penyekatan pertumbuhan *S. pombe* dan *F. oxysporum* melalui kaedah difusi ceper. Daripada 14 polypores yang lain, ekstrak POR18 daripada 'potato dextrose agar', juga menyekat pertumbuhan *G. boninense* apabila diuji dengan kaedah difusi ceper. Selain daripada itu, ekstrak methanol daripada kultur *Albatrellus* sp. cecair statik di dalam medium dektros kentang telah menyekat pertumbuhan *F. oxysporum* f.sp. *cubense* race 4 tetapi tiada aktiviti terhadap *S. pombe*. Di samping itu, POR 58 juga menyekat pertumbuhan *F. oxysporum* f.sp. *cubense* race 4.

Polypores juga telah diuji kebolehannya dalam penghasilan enzim seperti tirosinase, lakkase dan lignin peroksidase melalui ujian penyaringan plat. 12 daripada 15 polypores telah menghasilkan enzim lignin peroksidase tetapi hanya *Trametes versicolor* (POR 33D),

Polypore sp. (POR 35), *Pycnoporus* sp. (POR11) dan POR 36 menunjukkan aktiviti yang tinggi. Selain itu, *T. versicolor* (POR 33D) dan POR 58 juga menunjukkan aktiviti yang tinggi terhadap penghasilan enzim lakkase. Untuk penghasilan enzim tirosinase, *M. xanthopus* (POR 57) dan POR 48 telah memberikan keputusan yang baik. Ekstrak daripada kultur cecair 'potato dextrose' POR 33D dan POR 35 telah diuji untuk aktiviti lignin peroksidase, didapati nilai lignin peroksidase yang dihasilkan oleh POR 33D dan POR 35 adalah 6.146 U / mL dan 8.148 U / mL masing-masing.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisor; Prof. Dr. S. Vikineswary for her guidance, constructive in guiding me throughout the project is deeply appreciated.

I also would like to express my sincere appreciation to my friends in Mycology Laboratory, especially Agne, Wong Kah Hui and Ng Ching Ching. Thank for teaching me the methods and giving me many helpful comments and suggestion that have improved my project greatly.

Many thanks to my wife, Chok Sook Fan for your continuous supports, patience and assistance throughout my project and will always cherish the memories. Lastly, I would like to share my greatest pleasure in completing this thesis with my parents. Thanks for your encouragement and having faith in me.

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LIST OF SYMBOLS AND ABBREVIATIONS

%	Percentage
^{0}C	Degree Celsius
Abs	Absorbance
DMSO	Dimethylsulphoxide
DPPH	1, 1-Diphenyl-2-Picrylhydrazyl
EC_{50}	Effective concentration that produces 50% of the maximal possible effect.
e.g.	Example
et al.	and others
etc	and others
g	gram
GYMP	Glucose-Yeast-Malt-Peptone
KUM	Kulat Universiti Malaya
Lac	laccase
LiP	lignin peroxidase
µg	microgram
ME	malt extract
mg	milligram
ml	mililiter
mm	milimeter
MMN	modified Melin Norkrans medium
MnP	Manganese-dependent lignin peroxidase
PDA	potato dextrose agar
SDA	sabouraud dextrose agar
sp.	specie
spp.	Species
SSF	Solid substrate fermentation
VP	versatile peroxidase
w/w	weight/weight
YPG	yeast – peptone – glucose