

**ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES OF MACROFUNGI AND
MEDICINAL PLANTS**



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Contents

1. Letter of Report Submission	iii
2. Letter of Offer (Research Grant).....	iv
3. Acknowledgements	viii
4. Enhanced Research Title and Objectives	ix
5. Report.....	1
5.1 Proposed Executive Summary	1
5.2 Enhanced Executive Summary	2
5.3 Introduction	3
5.4 Brief Literature Review	4
5.5 Methodology	5
5.6 Results and Discussion	8
5.7 Conclusion and Recommendation.....	14
5.8 References/Bibliography	15
6. Research Outcomes	17
7. Appendix	18
Appendix A	18
Appendix B	25
Appendix C	27

5. Report

5.1 Proposed Executive Summary

Mount Singai is located in between Bau and Matang area, Sarawak. In the past, the Bisingai tribe actively gathered forest products and planted crops in their clearings at the mountain. Almost half of the plants species with medicinal uses and fungi, such as agaric mushrooms, polypore fungi, boletes, bird's nest fungi, coral fungi, cup fungi and jelly fungi found in this areas during an expedition on Mount Singai in September to December 2010. Thus, the documentation of these plants and impacts of these activities on their composition in the area would be an interesting discovery. An expedition on Mount Singai will be carried out to conduct the survey on understorey plants, particularly the fungi and medicinal plants in the studied areas at Mount Singai. The studied area, which located from the bottom (52 m above sea level) to the top (557 m above sea level) of Mount Singai, will be divided into 16 plots. Each plot will be subdivided into 2 subplots. Fungi and medicinal plants will be photographed within the 16 plots. Further analysis and characterization on the data collected as well as information on their distribution will be undertaken. In addition, their chemical contents, such as alkaloid, triterpenoids, steroids, flavanoids and saponin, and the biological activities, such as antioxidant and antimicrobial properties will be evaluated on these selected fungi and medicinal plants from Mount Singai. The documentation and publication on Mount Singai will promote this place as one of the favourite tourism spot, which will enhance the economy of the local communities. Furthermore, the outcome of this project is a document of medicinal plants and fungi rich in the range of chemical constituents and biological profile for further investigation for potential in drug development.

5.2 Enhanced Executive Summary

Mount Singai is one of an important habitats for various species of insects, birds, small mammals, amphibians and reptiles for breeding, food and shelter in Bau area. This mountain is still covered with forest eventhough the foothills and the surrounding area already explored for agriculture to form secondary forest but on top, lowland dipterocarp forest trees are widely scattered. About 70% from approximately 150 understory plants have overlapping or combination uses for food, medicine, landscaping and spiritual such as Kacip Fatimah (*Labisia pumila*), Tongkat Ali (*Eurycoma longifolia*) and Gaharu (*Aquilaria* spp.) were spotted in this area. More than 50 species of macrofungi were also encountered in Mount Singai. These fungi include agaric mushrooms, polypore fungi, boletes, bird's nest fungi, coral fungi, cup fungi and jelly fungi. Becoming a main source of medicine among the folks since 200 years ago, it is interesting to document and study the biological activities through phytochemical screening, antioxidant and antimicrobial of these medicinal plants and fungi found in Mt Singai.

Different parts of 16 selected medicinal plants and 7 selected fungi were extracted, phytochemical screened (alkaloids, saponin, triterpenes and steroids) and assayed for antimicrobial activities [Minimum Inhibition Concentration (MIC) and Minimum Bactericidal Concentration (MBC)] and antioxidant based on DPPH.

All the seven selected fungi collected from Mount Singai, except *Fomitopsis dochmia* demonstrate high antimicrobial activity. The results showed that six of these fungi have the great potential to be developed into pharmacological products. *Ganoderma australe* is the most anti oxidative compared to the other fungi which may due to the high content of alkaloid. Meanwhile, all of the medicinal plants exhibited good antimicrobial properties against five bacteria. Furthermore, *Curligo latifolia*, *Bauhinia accuminata*, *Rhaphidophora foraminifera*, *Bauhinia species* and *Macaranga gigantea* also demonstrated good antioxidant properties by recorded percentage results around 70-100%.

5.3 Introduction

Mount Singai has been settled by the BiSingai Bidayuh for more 300 years ago after they moved from neighbouring Mount Sungkung in West Kalimantan, Indonesia. Practicing pagan religion and lived in eight villages half way up the mountain and farmed the mountain sides and surrounding foothills. More than 40 years ago, this mountain has been abandoned. The community left this place and moved downhill and form 12 villages as we can see today. The only grim reminder of the Bisingai's glorious past there is the Catholic Memorial and Pilgrimage Centre (CMPC) built by Roman Catholic Community beginning in early 1980s at the old village site. Every weekend, hundreds of people ascend Mount Singai with most stopped at CMPC while some others continue to the summit.

Their farming patterns resulted in a mosaic of vegetation cover at different successional stages providing excellent opportunities for ecological studies. Hence the preservation and documentation of traditional use of resources in this mountain is made as in line with the National Biodiversity Policy and Malaysia's obligation under the Convention of Biological Diversity and can be promoted as one of the tourism products. Despite the presence of academic and research institutions in and around Kuching, comprehensive study of the environment and people of Singai has not been conducted.

During an expedition on Mount Singai on September to December 2010, almost half of the plants species with medicinal uses were found in the area and more than 50 species of macrofungi were encountered.

Fungi, being part of the forest flora, play an important role as the main decomposer in the forest ecosystem. In addition, some fungi have mutualistic association with the forest trees in the form of mycorrhizae whereas some are parasites. Both microfungi and macrofungi exist in a forest. The common macrofungi in a tropical forest include agaric mushrooms, polypores or bracket fungi, boletes, cup fungi and jelly fungi. In addition, it is also rich in medicinal plant used by the old folk and local people. However, the diversity of tropical macrofungi and medicinal plant in this area is still poorly known. Some fungi are consumed as food by the indigenous people and some like *Ganoderma* are well known for its medicinal values, thus, the treasure of fungi is still waiting to be uncovered.

Almost half of the plants species found in this area are useful with medicinal purpose. These plants are used by the local communities to treat various sickness. This traditional knowledge past from one generation to generation. So it would be interesting to study and profiling this medicinal plant.