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## Utilisation of macrofungi species in Malaysia

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The nutritional and medicinal properties of many macrofungi are well known and documented in Europe, China and Japan. However, such information is scanty and poorly known in Malaysia. This dearth of information is probably due to the lack of a traditional “mushroom culture” in Malaysia as well as a shortage of trained mycologists/fungal taxonomists. Cultivated mushrooms, e.g. oyster mushrooms (*Pleurotus* spp.), shiitake (*Lentinula edodes*), Jew’s ear fungus (locally called monkey’s ear fungus) (*Auricularia* spp.) and paddy straw mushroom (*Volvariella volvacea*) have long been utilised in Malaysia for food by the Malays, Chinese and Indians. However, amongst some local and many indigenous communities (aborigines), species of local macrofungi are utilised not only for food, but also as medicine and for spiritual purposes, including discouraging certain undesirable behaviour in children. Our observations indicate that some species of *Auricularia*, *Cookeina*, *Cyathus*, *Favolus*, *Lentinus*, *Pleurocybella*, *Schizophyllum* and *Termitomyces* are consumed as food. Species of *Lignosus*, *Pycnoporus*, *Lentinus* and *Daldinia* are used to treat various ailments or health related conditions. A species of *Amauroderma* is used to prevent fits while a species of *Xylaria* is used to stop bed-wetting in children.

**Key words:** Food, fungal utilisation, indigenous peoples, medicine

### Introduction

The nutritional and medicinal properties of many macrofungi are well known and documented in Europe, China and Japan (Dickinson and Lucas, 1983; Huang, 1993, 1998). However, such information is very scanty and poorly documented in Malaysia. Many earlier studies of Malaysian fungi were of a floristic nature with the most important work being contributed by the late E.J.H. Corner (e.g. Corner and Bas, 1962; Corner, 1966, 1972; see Watling and Ginns, 1998). Studies on fungal utilisation are more infrequent and sporadic with limited reports in publications by Burkill (1966), Chin (1981, 1988) and Chang and Lee (2001). This dearth of information is probably due to the lack of a traditional “mushroom culture” in Malaysia as well as a shortage of trained mycologists/fungal taxonomists (Hyde, 2003). Collecting wild mushrooms for

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the table and other uses is an activity largely confined to some small rural and aboriginal communities. Until recently, only imported dried and canned mushrooms were available in urban areas. However, a limited variety of cultivated mushrooms have become available in supermarkets and wet markets, although again these are mostly exotic species such as shiitake, oyster and button mushrooms. A limited variety of wild mushrooms such as *Schizophyllum commune* and species of *Termitomyces* can occasionally be found in local weekend and farmers' markets.

Traditional forest related knowledge (TFRK) is an important aspect in sustainable forest management and in understanding the ecology of forest ecosystems. It provides invaluable information on the diversity of organisms within this ecosystem. Of Malaysia's neighbouring countries, Thailand, has relatively more information on the utilisation of macrofungi (Ruksawong and Flegel, 2001; Sutachit and Sutachit in Chamratpan, 2003; Chamratpan, 2003) than Indonesia and the Philippines, and little information is available for Malaysia itself.

This paper discusses some of our observations on the utilisation of macrofungi in Malaysia.

## **Study Approach**

Information was obtained through three methods: a) literature search, b) a small pilot study and c) general observations of macrofungi sold in local markets.

### ***Literature search***

For this component of the study, all available local mycological related literature was searched and relevant information recorded.

### ***Pilot study***

A pilot study was carried out in three Temuan (one of the six Proto-Malay tribes of aboriginal or indigenous people) settlements in the state of Selangor, Malaysia, where herbalists or elders in each settlement were interviewed informally (Chang and Lee, 2001). The three settlements were located on the fringes of secondary forests, outside urban centres.

***Macrofungi in local markets***

Three supermarkets were selected based on their clientele (Table 1) to find out if the demand of different clientele had an effect on the types of mushrooms sold. All macrofungi/mushrooms and mushroom related products on display and for sale were noted and recorded.

**Table 1.** Supermarkets and targeted clientele.

Supermarket	Clientele
1	Local consumers
2	Local consumers and Japanese expatriates
3	Local consumers and other expatriates

Similar observations were made of the types of macrofungi on sale in the local wet and night markets in the Klang Valley, as well as some Chinese medical halls and speciality shops.

**Results and Discussion*****Literature search***

Our preliminary study and observations strongly suggest that there is a dearth of information on macrofungal utilisation in Malaysia, emphasising the point made by Lee and Chang (2002) about the poor state of knowledge on macrofungi in Malaysia.

Information obtained from the literature is summarised in Table 2. Burkill (1966) documented the use of several fungi by local communities for the treatment of a variety of ailments. Among others, he noted that the sclerotium of a *Lignosus* species (“cendawan susu harimau” or “susu rimau” in Malay language or tiger’s milk fungus in English) was used to treat consumption and coughs, a paste of *Daldinia concentrica* for treating itchiness of the skin and *Lentinus tuber-regium* for treating diarrhoea. Some of these species are still used by the Malays, Chinese and indigenous communities in Malaysia.

Chin (1981, 1988) reported the edible and poisonous fungal species of Sarawak, in particular those used by the indigenous Iban, Melanau and Malays. He documented 50 edible and 14 poisonous species.

More recent reports on utilisation of macrofungi by local communities in Peninsular Malaysia were made by Chang (1997) and Chang and Lee (2001).

**Table 2.** Edible and medicinal species of macrofungi (both imported and local) reported for Malaysia.

<b>Source</b>	<b>Edible species</b>	<b>Medicinal species</b>
Burkill (1966)	21	11
Chin (1981, 1988)	50	–
Chang (1997)	8	9
Chang and Lee (2001)	4	3
Total number of species	83	23
Total number of different species	71	12

### ***Pilot study***

Results of the pilot study of macrofungal utilisation by inhabitants of the three Temuan settlements are shown in Table 3.

The medicinal properties claimed by indigenous people for the various macrofungi have yet to be verified by scientific methods. However, it is clear that such ethnomycological information is far from complete. It is therefore very important that efforts continue to collect such information to ensure proper documentation of our precious traditional forest related knowledge. Such knowledge is increasingly being lost due to urbanisation of indigenous communities, lack of interest by the younger generations of such communities, and shrinking forest areas. However, there is increasing consumption of organic or natural products, of which mushrooms are an important component.

### ***Macrofungi in local markets***

A survey of the three supermarkets (Table 4), local wet/night markets, certain speciality shops and Chinese medical halls showed that at least six to eight different species of cultivated edible mushrooms were available fresh, dried or canned. These species included shiitake (*Lentinula edodes*), enokitake (*Flammulina velutipes*), *Agaricus* spp. (mainly *A. bisporus*), *Pleurotus* spp., straw mushroom (*Volvariella volvacea*), Jew's ear (*Auricularia* spp.), nameko (*Pholiota nameko*), shimeji (*Hypsizygos* sp.), white jelly fungus (*Tremella fuciformis*) and bamboo mushroom (*Dictyophora indusiata*).

**Table 3.** Utilisation of wild fungi by the Temuans of Peninsular Malaysia.

<b>Fungi</b>	<b>Utilisation</b>	<b>Preparation</b>
<i>Amauroderma</i> sp. (cendawan budak sawan)	Prevention of fits	Hollow stipe is worn around the neck to prevent fits
<i>Auricularia</i> spp. (cendawan memeh, cendawan telinga kera)	Food, considered good to eat	Cooked with other ingredients
<i>Cookeina</i> spp.	Food, eaten occasionally As bait for fishing	Cooked with other ingredients Rubbed against fishing hook
<i>Lentinus</i> spp.	Food	–
<i>Lignosus</i> spp. (cendawan susu harimau)	Medicine, to treat coughs, asthma and to strengthen weak constitution	The sclerotium is sliced and boiled with other herbs such as “tongkat ali” ( <i>Eurycoma longifolia</i> ) root, and the resulting decoction is drunk
<i>Microporus xanthopus</i> (cendawan pengering)	To stop a child from breast feeding	–
<i>Pycnoporus sanguineus</i> (cendawan bering)	Medicine, to treat sores	Fruit body is burnt to ash, mixed with coconut oil and applied onto the affected part
<i>Termitomyces</i> spp. (cendawan busut, cendawan melukut, cendawan susu pelanduk)	Food, highly sought after	In soups
<i>Xylaria polymorpha</i>	To stop a child from bed wetting	–

(Source: Chang and Lee, 2001)

The supermarket survey indicated that the clientele has some effect on the types of mushrooms sold. Supermarket 3, which has a large European expatriates clientele often had Portobello (*A. arvensis*) and white button mushrooms (*A. bisporus*) on sale. Portobello, which is popular in European cuisine, was absent from the shelves in Supermarket 1, which targets local consumers. Supermarket 2 targeting mainly Japanese expatriates, tended to sell mushrooms preferred by Japanese expatriates such as nameko, shimeji and enokitake. Even though the expatriate population is small, the availability of the more exotic species indicates that there is a demand for such mushrooms.

In local wet markets, fresh *Pleurotus* spp., shitake and enokitake were usually available. These are cultivated locally but some are also imported from neighbouring countries. Dried imported *Dictyophora indusiata* was available in some stalls. Occasionally, the imported king *Pleurotus* (*P. eryngii*) was on sale

**Table 4.** Edible macrofungi available in three local supermarkets.

Item	Supermarket		
	1	2	3
<i>Agaricus bisporus</i>	C	F <sub>i</sub> , C	F <sub>i</sub> , C
<i>Auricularia</i> spp.	D	D	D
<i>Flammulina velutipes</i>	F <sub>l</sub> , F <sub>i</sub> , C	F <sub>l</sub> , F <sub>i</sub> , C	F <sub>l</sub> , F <sub>i</sub> , C
<i>Ganoderma lucidum</i>	D, HS	D, HS	HS
<i>Hypsizygus</i> sp.	NA	F <sub>i</sub>	NA
<i>Lentinula edodes</i>	F <sub>l</sub> , F <sub>i</sub> , C	F <sub>l</sub> , F <sub>i</sub> , C	F <sub>l</sub> , F <sub>i</sub> , C
<i>Pholiota nameko</i>	NA	F <sub>i</sub>	F <sub>i</sub>
<i>Pleurotus</i> spp.	F <sub>l</sub> , C	F <sub>l</sub> , C	F <sub>l</sub> , C
Portobello or <i>Agaricus arvensis</i>	NA	F <sub>i</sub>	F <sub>i</sub>
<i>Schizophyllum commune</i>	F <sub>l</sub>	NA	NA
<i>Tremella fuciformis</i>	D, HS	D, HS	D
<i>Volvariella volvacea</i>	C	C	C

F<sub>l</sub> = fresh, locally cultivated; F<sub>i</sub> = fresh, imported; C = canned; D = dried; HS = herbal soup, mix; NA = not available.

in some wet markets. Local wild *Schizophyllum commune* and species of *Termitomyces* were sometimes available in night markets. The highly sought after *Termitomyces* spp. were sometimes sold at temporary stalls set up along roadsides. However, it was rare to see them in the markets, as most are consumed by the collectors themselves. The more unusual exotic species such as truffles (*Tuber* spp.), maitake (hui shu-hua or *Grifola frondosa*) and monkey's head (*hericium erinaceum*) were found in speciality shops or in selected restaurants.

Several macrofungal species with medicinal properties are sold in Chinese medical halls throughout the peninsula. These are mainly imported from China and Taiwan. Many are used in traditional preparations for herbal remedies, herbal soups and teas. Some examples of such species are listed in Table 5.

Early Chinese settlers probably introduced many of the edible fungal species available today. With new technologies, and travel and information becoming increasingly accessible, more species and varieties of fungi are entering the local markets. However, in Malaysia, these are all exotic species and as far as we know, no local species have penetrated the local market. It is probable that no local or indigenous macrofungi are yet cultivated in Malaysia.

The use of fungi by people results from knowledge and experience accumulated over time. Ultimately this provides the basis for commercial exploitation/exploration of the resource. There is an indication that local

consumers are becoming more accepting of new species and varieties of edible fungi. The Malaysian government is increasingly recognising the importance of traditional knowledge and biological diversity and the opportunities they provide for biotechnology and commercialisation. We plan to conduct further ethnomycological studies by interviewing elders of additional Proto-Malay tribes, thereby increasing our knowledge of fungal utilisation in Malaysia.

**Table 5.** Some examples from Malaysia of medicinal fungi used in traditional Chinese medicine

Medicinal mushroom	Usage
<i>Cordyceps sinensis</i>	A tonic, used in herbal remedies, soups, and chicken essence to boost the immune system
<i>Ganoderma lucidum</i>	In many herbal remedies, soups, and teas to boost the immune system
<i>Marasmius androsaceus</i>	To treat nerve pains, rheumatic pains and migraine
<i>Polyporus umbellatus</i>	To treat difficulty in urination, acute nephritis, systemic dropsy, thirst and oedema
<i>Tremella fuciformis</i>	A tonic, to stimulate the immune system
<i>Wolfiporia cocos (Poria cocos)</i>	A major ingredient in many herbal remedies

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