

Status and potential of mushroom industry in Malaysia (Status dan potensi industri cendawan di Malaysia)

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Abstract

Global mushroom trade has shown a significant upward trend over the last three decades. This is especially so for fresh and dried mushrooms, and Malaysia is not excluded from this industry. The demand for mushroom in Malaysia requires about 50 t/day, of which the current production is only 24 t/day. The import value had increased from RM9.71 million in 2005 to RM18.18 million in 2012. Mushroom production in Malaysia can be increased to fulfil the demand in the domestic market. Yet, there are factors which have led to a shortage in the supply. Among these are the high input prices in the market that reduce the profit and the viability level of mushroom production. However, mushroom production might pave the way for national revenue if given serious consideration and therefore, will reduce the food import value. The climate in the regions of Malaysia is conducive for growing a wide variety of specialty mushrooms at a low cost, and cultivation of these species is likely to increase both the quantity and quality of national production of mushroom in the coming years.

Introduction

Mushrooms are fungi that contain high protein, carbohydrate, multivitamins and minerals which are good for the health and a rich source of folic acid. Scientific studies confirm that vitamins and minerals in mushrooms are suitable for nutraceutical, pharmaceutical and cosmetic products. People consume edible mushrooms for their nutritional, medicinal and recreational activities or for religious purposes.

Generally, there are over 2,000 edible fleshy mushroom varieties worldwide with less than 100 being cultivated. Mushrooms are cultivated in over 60 countries with China, USA, Netherlands, Poland and Spain being the top five producers in 2012. Malaysia is also a producer of mushrooms and about 1,000 tonnes of

mushrooms are grown annually for the local and export markets. The Malaysian climate makes it possible for 17 varieties of mushroom to be grown, but only eight are cultivated commercially. These include the abalone (*Pleurotus cystidiosus*), rice straw (*Volvariella*), *telinga kera* (*Auricularia polytricha*), grey oyster (*Pleurotus sajor-caju*), white oyster (*Pleurotus florida*), red oyster (*Pleurotus flabellatus*), ganoderma (*G. applanatum*) and shiitake (*Lentinusedones*).

The mushroom industry in Malaysia is new and small, but currently growing steadily. The demand for mushroom is increasing in line with the increased awareness of consumers towards health and the promotion by government agencies and NGOs concerning its many benefits.

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The higher demand for mushrooms from the local as well as global markets is a great opportunity for Malaysia to take advantage of the lucrative trade. Mushroom has become the cutting-edge for economic development through its contribution to the gross national income (GNI). It has been selected as one of the seven commodities that can be developed commercially to generate higher income for the farmers and the country.

Under the agro-food policy statement of 2011, mushroom was projected to contribute about RM300 million to the GNI in 2020. This target could be achieved through the increase of production areas and productivity to 340 ha and 193 t/ha respectively. It is a big challenge for the government to strategise its programmes and activities to achieve this target. This article aims to evaluate the world trend of mushroom trade and identify the current situation of the mushroom industry in Malaysia. Some suggestions for future development of the industry are also highlighted for consideration.

Methodology

The data for this study are acquired from secondary sources, such as reports published by the Food and Agriculture Organisation (FAO), the United Nation data provider (Comtrade), and the Department of Agriculture, Malaysia. The data used included the production areas, as well as the import and export information of fresh and processed products. A critical analysis was carried out to evaluate the prospects based on the recent global trends of mushroom production and Malaysia's import-export performance.

Result and discussion

World mushroom producers

The global producers of mushroom during the last decade remained virtually unchanged. During 1990 – 2012, the major producers of mushrooms were China, USA, Netherlands, Poland and Spain.

The total production of mushrooms by these countries was 7.772 million tonnes in 2012, increasing tremendously from 1.995 million tonnes in 1990 – an increase of nearly 290% (*Table 1*).

China is still the main producer of mushrooms in the world, producing 5.15 million tonnes of fresh and processed products yearly. The production of mushrooms in China grew from 0.66 million tonnes in 1990 to 2.4 million tonnes in 2000 and 4.83 million tonnes in 2010. The production had further increased to more than 5 million tonnes in 2012. The tremendous increase of production in China was contributed by the increase of land area and productivity. On the other hand, the production of mushrooms in other countries grew steadily between 1% and 5% annually.

World mushroom trade

In general, mushrooms are traded in three categories: fresh, dried or canned and processed as mushroom-based products. Fresh mushroom is a highly perishable commodity and must be consumed after harvest. However, the shelf-life of fresh mushrooms can be enhanced if stored in temperatures below 20 °C. Thus, most of the fresh mushrooms are traded in the local markets. Dried mushrooms can be stored for a longer period and can be transported to other parts of the world. The mushroom-based products, on the other hand, are mushrooms which are processed as sauces, cosmetics and medicinal products. It is estimated that about 50% of the mushrooms are traded fresh for domestic markets and the other 50% are processed or dried products.

Mushroom consumption is mainly concentrated in six countries known as the G-6 (USA, Germany, UK, France, Italy and Canada) which makes up 85% of the world consumption. The varieties of mushroom cultivated internationally are the button (31%), shiitake (24%), oyster (14%), black

ear (9%), paddy straw (8%) and milky/others (NRCM 2009).

Fresh mushroom export

The main exporters of fresh mushrooms in 2012 are Poland, Netherlands, China, Ireland and Canada (*Table 2*). Poland consistently exports its mushrooms, and in 2012 it exported nearly 173,000 tonnes of fresh mushrooms, increasing from 158,000 tonnes of the previous year. China, on the other hand, became one of the important exporters since 2012 when it suddenly exported more than 41,000 tonnes of fresh mushrooms, a tremendous jump from only 1,320 tonnes in 2011. It is believed that China started to export its fresh mushrooms when its production increased highly in the same year. The other countries also showed

positive export trends over the years, indicating the higher demand from non and low producers of mushrooms in the world.

Fresh mushroom import

The main importers of fresh mushrooms in the world are the United Kingdom, Germany, Russia, France and USA (*Table 3*). The importers of fresh mushrooms in the world are from Europe. Generally, these countries are also the producers of mushroom, but the local producers are unable to meet the higher demand by consumers. For example, the United Kingdom has started to increase its importation in 2012, in line with the reduction of local production. The United Kingdom imported more than 80,000 tonnes of fresh mushrooms in 2012, when the local

Table 1. World's mushroom producing countries, 1990 – 2012 (tonnes)

	1990	1995	2000	2005	2010	2012	%
China	662,645	1,208,672	2,408,234	3,409,686	4,833,725	51,50,000	66.26
USA	324,315	352,836	383,830	386,984	359,469	388,450	5.00
Netherlands	147,000	230,000	265,000	245,000	266,000	304,000	3.91
Poland	104,000	114,235	113,479	160,000	230,000	220,000	2.83
Spain	74,479	75,968	63,254	137,764	133,000	148,000	1.90
France	195,700	164,154	203,811	138,541	119,346	115,669	1.49
Italy	79,381	65,285	72,492	88,361	399,997	761,858	9.80
Canada	52,240	62,690	80,241	80,071	72,930	78,930	1.02
Japan	79,100	74,495	67,224	66,000	59,550	60,180	0.77
United Kingdom	123,137	101,671	89,900	74,000	69,300	69,300	0.89
Iran	10,000	7,108	6,000	27,908	74,000	82,500	1.06
Total	1,995,227	2,675,951	4,090,928	5,161,579	7,011,422	7,772,149	

Source: FAOStat (2004 – 2012)

Table 2. Fresh mushroom: Global export, 2008 – 2012 (tonnes)

	2008	2009	2010	2011	2012
Poland	122,984	123,195	157,844	158,070	172,959
Netherlands	85,777	80,021	95,661	104,835	115,789
China	67	317	436	1,318	41,529
Ireland	72,388	43,764	41,305	37,267	37,522
Canada	20,309	19,851	28,424	27,109	31,456
Belgium	32,613	25,814	25,790	28,603	30,534
Lithuania	32,621	32,876	21,585	24,955	27,657
Germany	4,125	4,897	5,045	7,018	9,821

Source: Comtrade (2004 – 2012)

production dropped to 69,300 tonnes in the same year. In other words, the United Kingdom imports fresh mushrooms to meet the demand of domestic consumers. The importation of mushrooms by other countries is increasing every year, except for France that shows a slight drop to 44,570 tonnes in 2012, from 47,714 tonnes in 2011 (*Table 3*).

Dried mushroom export

Generally, the most traded mushrooms in the world are the dried products. China remains as a leading world exporter from 2004 – 2011, together with the USA, Netherlands, Germany, and the Republic of Korea. In 2012, the total dried mushrooms traded in the world (import and export) were 1.2 million tonnes, of which more than 700,000 tonnes were for export and 511,000 tonnes for import. The export of dried mushrooms had decreased from 913,224 tonnes in 2010 to 839,252 tonnes in 2012 (*Table 4*). One of the factors that had contributed to this was the decline of exportation by China and other mushroom producing countries. Despite the reduction in the total export, the Netherlands had increased its export from only around 18,000 tonnes in 2010 to 56,500 tonnes in 2012. Malaysia has played a significant role in the export markets, when it has been in the top ten dried mushroom exporters since 2004. Malaysia exports more than 1,000 tonnes of dried mushrooms annually.

Dried mushroom import

The import of dried mushrooms in the world also shows a downward trend from 2004 to 2012 (*Table 5*). The biggest drop in the importation of mushrooms was recorded in 2012 when it came down from 937,616 tonnes in 2011 to around 775,954 tonnes in 2012, a fall of 17.2%. Japan is the largest importer of dried mushroom, where the annual import is 80,000 – 86,000 tonnes. Nonetheless, Japanese importation had also shown downward trends, especially from 2007 to 2009, before stabilising at

the 85,000-tonne mark in the period of 2010 – 2012. This reduction is believed to have a strong relation with the increase of local production.

Prospect of the Malaysian mushroom industry

The demand for mushrooms in Malaysia is projected to increase in line with the increase in population and consumption per capita due to higher concerns towards health and other benefits. The consumption per capita is projected to increase from 1.0 kg in 2008 to 2.4 kg in 2020. This increment will give an idea about future demand for mushrooms in the local markets. The demand is estimated to increase from 20,000 tonnes in 2008 to around 48,000 tonnes in 2020. Higher demand is expected for all three categories: fresh, dried and mushroom-based products. Fresh oyster mushrooms are highly demanded by end users, while the shiitake and button mushrooms are popular varieties of institutional consumers, especially hotels. The demand for medicinal, nutraceutical and cosmetic products with mushrooms as their raw materials is expected to increase in future, in line with the awareness towards health benefits, especially by women and young consumers. The demand for mushroom-based products such as mushroom flavoured beverages and snacks are also expected to increase tremendously.

The demand for mushroom in the global markets is also high. Thus, there is a great opportunity for the Malaysian mushroom industry to develop and contribute to the gross national income (GNI). Malaysia should focus on mushrooms that have extensive markets, such as the shiitake and buttons, and double the exports from 1,000 tonnes to 2,000 tonnes a year. Malaysia should also focus on exports to the European markets which have a higher and a sustainable demand. These markets are also attractive because they cover a large area with more than 500 million potential consumers.

Table 3. Fresh mushroom: Global imports, 2008 – 2012 (tonnes)

	2008	2009	2010	2011	2012
United Kingdom	99,207	77,655	79,249	78,017	84,101
Germany	54,048	52,797	65,451	63,257	76,136
Russia	39,381	46,616	49,713	49,968	60,361
France	27,559	26,058	25,151	47,714	44,570
USA	25,684	27,343	35,551	33,181	43,354
Netherlands	47,378	23,771	35,778	29,905	37,313
Ireland	9,219	15,233	26,340	28,145	28,535
Belgium	33,213	27,660	34,646	23,729	24,408
Italy	3,067	2,414	4,751	4,732	19,042
Lithuania	23,078	19,429	10,678	11,035	13,969

Source: Comtrade (2004 – 2012)

Table 4. Dried mushrooms: Global exports 2004 – 2012 (tonnes)

	2004	2006	2008	2010	2012
China	38,488	30,456	30,651	65,905	52,767
Germany	9,001	10,031	10,565	10,752	10,734
Italy	7,504	8,135	5,983	5,972	5,167
France	4,582	7,659	4,608	4,127	3,817
Netherlands	2,311	2,345	13,292	18,237	56,548
Republic of Korea	3,314	2,576	3,062	3,338	1,910
USA	13,156	3,106	3,559	6,488	5,460
Malaysia	1,818	1,252	2,073	579	1,076

Source: Comtrade (2004 – 2012)

Table 5. Dried mushroom: Global imports, 2007 – 2012 (tonnes)

	2007	2008	2009	2010	2011	2012
Japan	105,537	90,885	81,865	85,427	85,251	85,814
Thailand	53,986	52,661	63,574	65,812	83,867	73,581
USA	33,804	16,343	19,529	26,131	31,077	24,625
Germany	27,381	27,209	17,616	20,681	21,823	21,482
Italy	19,236	21,393	16,736	19,222	16,180	16,222
Republic of Korea	15,954	20,697	20,066	28,439	29,065	1,637
Singapore	17,101	16,885	15,329	17,721	15,386	12,551
France	18,370	15,780	15,073	16,699	19,460	14,768
Indonesia	12,574	14,708	10,264	11,860	11,225	9,135
China	3,134	1,421	353	1,102	1,719	2,290

Source: Comtrade (2004 – 2012)

Current situation of the mushroom industry in Malaysia

Malaysia is a tropical country with hot and humid climates and high annual rainfall, with average range of temperature of 23 – 35 °C and humidity of 80 – 90%. Only a few mushroom species can be cultivated well in the Peninsular, especially the grey oyster, shiitake, ganoderma and white oyster.

The mushroom industry in Malaysia is relatively new and small. Currently, the production area of mushrooms is estimated at around 340 ha, and is operated by less than 400 farmers or entrepreneurs. The production of mushrooms is spread out in almost all the states, with the biggest production area in Selangor, followed by Johor and Kedah (Che Hasmah 2008). The production areas, however, have dropped from 600 ha (2000) to 340 ha (2012) as a result of the closure of operations, especially of the small and new farmers. One of the factors that contributed to it is lack of capital. Generally, when pests attacked the media for mushroom growths, thus failing in production, farmers were unable to start the second round of production because of this lack of capital.

Mushroom cultivation in Malaysia is on a small scale, of which the average production area is between 800 and 5000 square feet per farmer. There are seven varieties of mushroom cultivated in Malaysia, the most popular ones being the grey oyster, followed by white oyster, ganoderma, shiitake and button. Oyster mushrooms are generally produced in the lowlands, while shiitake and button are in the highland areas. The small production areas resulted in a lesser amount of harvesting products, where the average production per farmer is 50 kg per day. As a result, local mushroom production is only sufficient to supply for local consumers. Only a few large scale farmers, specifically in the Klang Valley, can meet the demand from other areas and the export to Singapore.

Generally, oyster mushrooms are marketed to local consumers, while the shiitake and button are for export and processed products. The most common distribution channels for fresh mushrooms are the supermarkets, followed by night markets, wet markets and grocery outlets. The consumption per capita of mushrooms is 1.0 kg/person/year, and is projected to increase to 2.4 kg/person/year by 2020. The demand from local consumers is projected to grow to double digits in the future, driven by the increase in population, concerns towards a healthy lifestyle and by other new benefits found in mushrooms. The higher demand from domestic consumers has led Malaysia to import fresh and processed mushrooms from other countries.

Import and export of mushroom in Malaysia

Import of mushrooms Malaysia has imported more than 5 tonnes of fresh and dried mushrooms since 2009. The import increased every year and has reached more than 10 million tonnes in 2012, driven by a higher demand from the domestic market. China is the main supplier of fresh and dried mushrooms. Malaysia imported 2.71 million tonnes of fresh mushrooms valued at more than RM6.2 million and 3.11 million tonnes of dried mushrooms valued at more than RM11.99 million from China in 2012. The import of mushrooms from China increased steadily at an annual average of 9.23% for the fresh ones and 12.93% for the dried ones from 2009 (*Table 6*). The import of dried mushrooms, however, showed a slight drop compared to the amount in 2011 (3.45 million tonnes). The import of dried mushroom from China decreased because of its higher price. The price of dried mushroom has increased from RM3.28/kg in 2011 to RM3.85/kg in 2012. In contrast, the price of fresh mushrooms from China remained stable at RM2.28/kg in the same period (*Figures 1*).

Export of mushrooms Malaysia is one of the active trading nations for mushroom in the world. Malaysia started to export fresh and dried mushrooms in 1997. The main export destination in 2012 for fresh mushrooms was Singapore, while for dried mushrooms was Thailand. The export of fresh mushrooms to Singapore dropped to 1.78 million tonnes in 2012, from 2.16 million tonnes in 2011. One of the reasons for this was the increase in price. The price of fresh mushrooms had increased from RM3.25/kg to RM5.01/kg in 2012. On the other hand, the increase in export of dried mushrooms was also influenced by price. The price of dried mushroom from Malaysia had decreased to RM3.70/kg in 2012, a big drop from RM6.83/kg in 2011. This decline had led to an increase in the export of dried mushroom from 35.15 tonnes in 2011 to 86.7 tonnes in 2012 (*Table 7*).

Table 6. Import of fresh and dried mushroom from China to Malaysia, 2012 (tonnes)

	Fresh mushroom		Dried mushroom	
	Tonnes	RM'000	Tonnes	RM'000
2005	3,893	4,638	2,703	5,068
2006	3,979	5,517	2,577	5,758
2007	4,010	6,381	3,454	7,651
2008	3,870	7,487	3,463	7,355
2009	1,544	3,564	3,082	7,157
2010	2,708	4,549	3,425	8,936
2011	2,267	5,187	3,453	11,338
2012	2,706	6,196	3,110	11,986

Table 7. Malaysian main export destination

	Fresh mushroom			Dried mushroom		
	Country	Tonnes	RM'000	Country	Tonnes	RM'000
2005	Brazil	1,082	1,033	Other Asia, nes	98	69
2006	Brazil	1,314	1,386	China	35	81
2007	Brazil	1,288	1,966	Other Asia, nes	74	106
2008	Brazil	1,546	2,561	China, Hong Kong	83	466
2009	Singapore	1,060	4,281	Thailand	22	124
2010	Singapore	1,820	4,852	Thailand	17	208
2011	Singapore	2,155	7,026	Thailand	35	240
2012	Singapore	1,784	8,954	Thailand	86	320

Source: Comtrade (2004 – 2012)

Conclusion

Mushroom is an important commodity to generate income for Malaysia. The demand for mushroom in the global markets is high and it has a steady annual growth of about 15%. There is an increase in the global demand for mushroom with the awareness of its culinary, nutritional and medicinal values, either in the fresh or dried forms. The higher

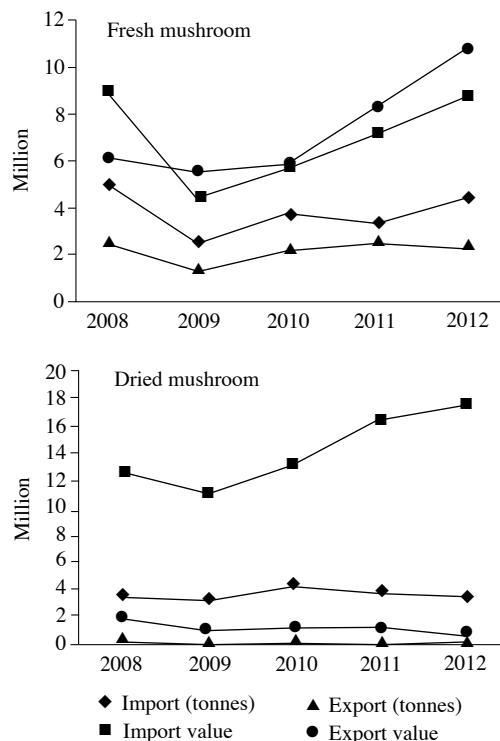


Figure 1. Fresh and dried mushrooms import-export of Malaysia

demand from global markets, especially the European ones, creates an opportunity for Malaysia to increase its export and become one of the leading suppliers of mushroom in the world. The increasing demand from new markets such as China, Japan and the Arab Countries will determine the future markets for mushrooms from Malaysia.

The demand for fresh and dried mushrooms from domestic consumers also shows an increasing trend over the past 5 years, and is expected to remain high. This is driven by the increase in population, their changing lifestyles towards healthy living, and is supported by government initiatives and programmes. Moreover, the emergence of new knowledge about mushroom benefits has led to the development of new products in the pharmaceutical, nutraceutical and functional food industries, thus requiring more raw materials.

Government initiatives such as financial aid for new producers/entrepreneurs, the introduction of new technology for production, and an efficient packaging system for the products have also helped the industry to develop faster. The vacuum pack technology, for example, will keep the mushroom fresh for a longer period. On top of that, advancing other food products like biscuits and breads in mushroom flavours which contain health values will be an alternative to products in different tastes like spicy, salty, etc.

However, some challenges have to be faced for the industry to be more competitive. The cost of production, especially for the development of mushroom houses and their equipment is increasing every year. The shortage of labour has led to the increase in the operational costs. This has resulted with the mushroom farmers moving to other subsectors such as vegetable cultivation which require lesser capital. The industry requires new production technology that uses less labour and has a higher productivity. Moreover, it should be transformed from small-scale to a big-scale production so that the management is more efficient and effective. These steps will enhance the production and productivity for better quality products.

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Abstrak

Perdagangan cendawan global menunjukkan peningkatan trend sejak tiga dekad yang lalu. Terutamanya untuk cendawan segar dan cendawan kering, dan Malaysia tidak berkecuali. Permintaan terhadap cendawan di Malaysia memerlukan 50 t/hari manakala pengeluarannya hanyalah 24 t/hari. Nilai import meningkat daripada RM9.71 juta pada 2005 kepada RM18.18 juta pada 2012. Pengeluaran cendawan di Malaysia boleh ditingkatkan untuk memenuhi permintaan pasaran tempatan. Bagaimanapun ada beberapa faktor yang boleh menyebabkan kekurangan dalam penawaran. Antaranya ialah harga input yang tinggi di pasaran yang mengurangkan keuntungan dan aras daya maju pengeluaran cendawan. Pengeluaran cendawan mungkin dapat menyumbang kepada pendapatan negara jika diberi perhatian yang khusus dan seterusnya dapat mengurangkan nilai import makanan. Iklim di rantau Malaysia sesuai untuk menanam pelbagai varieti cendawan pada kos yang rendah dan penanaman pelbagai varieti ini mungkin dapat meningkatkan kuantiti dan kualiti pengeluaran cendawan negara pada masa akan datang.