Matsutake Trade in Yunnan Province, China: An Overview[1]

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Matsutake Trade in Yunnan Province, China: An Overview. Matsutake are economically important wild mushrooms that contribute greatly to rural livelihoods and local economies in many parts of the northern hemisphere. This paper provides an overview of the matsutake trade in Yunnan province, China, where increased attention is being given to the sustainable utilization of nontimber forest products. Topics covered include the distribution, production, and export of matsutake in Yunnan, and the market chain for matsutake in Yunnan, whereby matsutake are harvested from the wild and exported to Japan within 48 hours.

Key Words: Matsutake, mushroom, trade, Yunnan.

Introduction

Matsutake are the mushrooms or "fruit" of terrestrial, perennial fungi ectomycorrhizally associated with the roots of certain tree species (James 1998; Ogawa 1976). *Matsu-take* literally means "pine mushroom" in Japanese. Originally, matsutake referred to the prized Japanese species, *Tricholoma matsutake* (S. Ito & S. Imai) Singer, which grows principally with pine in Japan, but nowadays the name is applied loosely to any of a group of closely related species with a well-developed veil and characteristic spicy fragrance (Hosford et al. 1997). There are about 15 species of matsutake distributed worldwide (Liu et al. 1999; Zang 1990). They occur in Asia (mainly *T. matsutake*), North America (mainly *T. magnivelare* [Peck] Redhead, also known as the American or white matsutake), Europe and northern Africa (mainly *T. caligatum* [Viv.] Ricken), and Oceania (Wang et al. 1997). In China, five species and one variety have been reported from eight provinces (Liu et al. 1999), of which *T. matsutake* is the most valuable and intensively exploited.

As a seasonal delicacy favored by the Japanese, the matsutake has become a valuable and commercially important wild mushroom with a wholesale price in Japan of USD 27 to USD 560 per kg depending on quality and place of origin (Wang et al. 1997). Consumption of matsutake in Japan has been more than 4,000 metric tons annually (Wang et al. 1997), but less than 3,000 metric tons in recent years (Gong and Wang 2004; Saito and Mitsumata 2008, this issue). Most of the matsutake are imported from North Korea, South Korea, China, and North America.

The harvest of wild mushrooms in general and matsutake in particular can generate significant income. For example, in British Columbia, Canada, the wild mushroom industry harvests more than 250 metric tons a year, with a value of USD 25–45 million (Wills and Lipsey 1999). Collection of matsutake has become increasingly

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important in China's northwest Yunnan province in recent years as other income sources such as timber extraction have declined. In Shangri-la (formerly Zhongdian) County, up to 80% of local revenue used to be generated from logging, but a commercial logging ban was imposed in 1998 in an attempt to conserve watershed integrity (Xu and Wilkes 2004; Yeh 2000). Now, 50–80% of household income is generated by the harvest and sale of matsutake.

Methods

Data on the production and trade of nontimber forest products (NTFPs) is generally difficult to obtain, as they are traditionally part of the informal or "hidden economy" (Cunningham 2001). Prior to 2000, what data there was for matsutake production in Yunnan was scattered among different government sectors and offices and often mixed with other NTFP categories. Although the matsutake is not an endangered species, it has been given a protected status in China (National Grade II). Increased awareness of its commercial significance led the Endangered Species Import and Export Management Office of the People's Republic of China, Kunming Office (ESIEMO-Kunming), to begin compiling production and exportation data on a county-by-county basis beginning in the year 2000. In this paper, we integrate data for matsutake production and trade from ESIEMO-Kunming and the Matsutake Office of Shangri-la County in Diqing Prefecture in order to characterize the matsutake trade in Yunnan.

The analytical framework for the discussion of market networks was adopted from Cunningham (2001). Market categories were classified based on the size, location, function of the market, transportation infrastructure, and their regulation and information flow. Ethnobotanical field surveys were used to identify the principal actors in the market chain and to investigate the local means of resource access and management.

Results

Matsutake Production and Distribution in Yunnan

As shown in Table 1, one-third to nearly two-thirds of Japan's matsutake are imported from China (Gong and Wang 2004). Southwest China (mainly northwest Yunnan and southwest Sichuan provinces) accounts for almost 80% of the Chinese total; the second most productive area for matsutake in China is in the Northeast (Heilongjiang and Jilin provinces), near the Korean peninsula.

In Yunnan, the income from matsutake ranks number one among all exported agricultural products and NTFPs. In 2005, more than USD 44 million was generated by the export of matsutake. The distribution and abundance of matsutake in Yunnan is shown in Fig. 1. The most productive areas of Yunnan are located in the northwestern and western parts. For example, in 2005 the total exportation from Yunnan was around 1,300 metric tons. Diqing Prefecture (which includes Shangri-la, formerly known as Zhongdian) accounted for 47% of Yunnan's matsutake exports, while Dali, Chuxiong, and Lijiang prefectures accounted for 21%, 18% and 12%, respectively (Fig. 2).

The trend of matsutake production in Yunnan is difficult to evaluate within the limited time frame for which data are available. Data for Shangri-la County between 1998 and 2005 are shown in Fig. 3. As can be seen, there are great year-to-year differences in the amounts of matsutake harvested. The factors determining this fluctuation are weather (especially temperature and precipitation), price, and possibly the impact of previous harvests, though this has not been substantiated. It is generally agreed upon by local mushroom pickers, traders, and researchers that weather is the most significant factor contributing to crop fluctuations. While methods of harvest and habitat management are also considered important, it is difficult to quantify their impacts, if any, with the information available. Continued monitoring over the long term is necessary before a trend can be established.

Market Levels

Four levels of matsutake markets (Table 2) can be recognized in Yunnan based on their size (number of buyers and total amount of matsutake exchanged), location, function, transportation infrastructure, degree of regulation, and quality of information flow. The "village level sporadic primary market" is located far away from exchange points and/or has poor road connections. Hence some small buyers (normally local people who may themselves be mushroom pickers) buy up mushrooms and then transport them to a small- or intermediate-scale market. In remote areas the information flow to harvesters regarding

Table 1. THE IMPORTATION OF MATSUTAKE BY JAPAN (UNIT: METRIC TONS, ADOPTED FROM GONG AND WANG 2004).

	1995	1996	1997	1998	1999	2001
Total Importation	3,515	2,703	3,059	3,248	2,935	2,394
From South Korea	633	170	249	355	515	181
From North Korea	1,141	541	615	1,086	307	210
From China	1,191	1,152	1,076	1,313	1,292	1,531
% from China	34	43	35	40	44	64

price is poor, and few measures exist to regulate exchange activities.

As one moves up the chain of markets to the "small-scale" (town or village) markets and "intermediate-scale" (regional) markets, there is better transportation and information flow and more regulation. At the sporadic primary markets, it's all up to the buyers to decide the price. At the next level (small-scale market), local authorities are involved to a certain degree, for instance, by setting up a simple market place and helping in the management of the market. They may also monitor trading activities and enforce certain regulations such as prohibiting the sale of undersized matsutake. At this level, mushroom pickers can usually compare and negotiate the price with several buyers, though the differences among them may be small. At the intermediate-scale (regional)

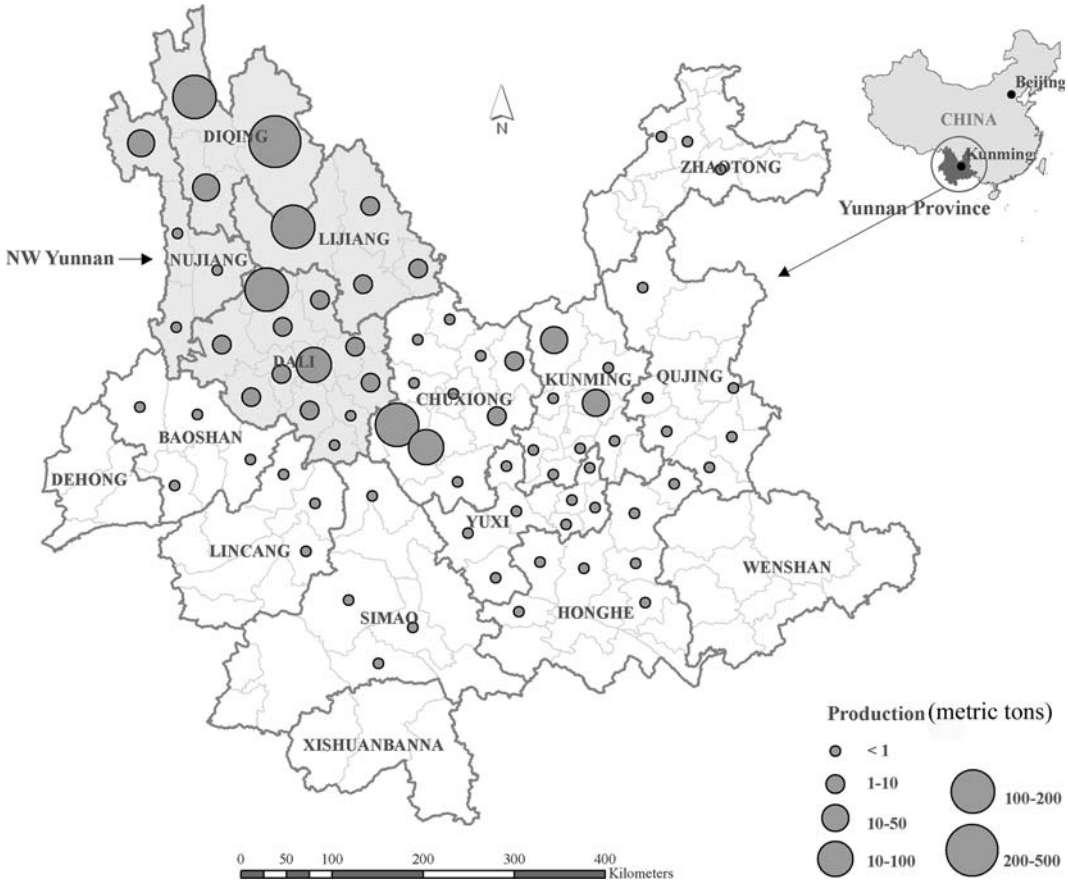

Fig. 1. Distribution of matsutake production in Yunnan Province (2005).

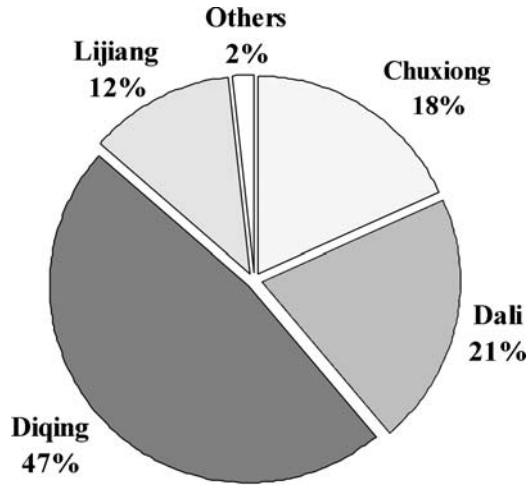

Fig. 2. Matsutake production in Yunnan Province by prefecture (2005). Total production = 1,300 metric tons.

market, government agencies are involved in management, taxation, and plant quarantine, and the trading entities have to document the quantities traded and get legal permits from pertinent government offices. The latter constitutes a formal and mature market system.

Characterization of the Market Chain and Its Actors

Actors in the market chain include mushroom pickers, local community authorities, middlemen, trading companies, exporting companies, and government authorities. Mushroom pickers are mainly local villagers who harvest matsutake within the boundaries of their village lands. In northwest Yunnan, they are mainly Tibetan, as well as Yi, Naxi, Lisu, and Bai. Normally, the local pickers walk early in the morning (or use a bicycle if a road is available) to the matsutake-rich areas. Generally it takes them 5–7 hours to find the matsutake and get back to the local (primary) market. In many places with high production, outsiders are also able to pick but are required to

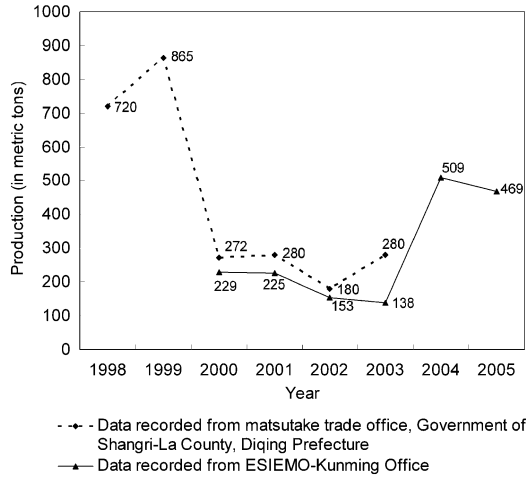

Fig. 3. Matsutake production of Shangri-La (formerly Zhongdian) County. The data collected from ESIEMO-Kunming is lower than that from Shangri-La Matsutake Office of the same year, probably because the Shangri-la figure includes matsutake preserved products consumed or sold locally or exported via Sichuan Province. Most of the matsutake in Shangri-la originate in Shangri-la and Deqin counties of Diqing Prefecture, but some also come from Ganzi Prefecture in neighboring Sichuan Province, and from Changdu Prefecture of the Tibetan Autonomous Region.

Table 2. MARKET CATEGORIES AND CHARACTERISTICS FOR MATSUTAKE IN NORTHWESTERN YUNNAN.

	Location and Activities	Function of the market	Number of buyers	Daily amount exchanged	Transportation infrastructure	Information flow	Market regulation
Village level sporadic primary market	Usually a remote village near the origin of the matsutake; buyers often mobile	Exchange	1–3	<200 kg	Poor: footpaths	Poor	None
Small scale market	Village roadside, village market, or local established market for matsutake	Primary grading, exchange	3–10	200–1000 kg	Country roads connecting to larger markets	Spotty	Locally regulated or not at all
Intermediate scale (regional) market	Regional economic center for the production area, normally the capital of prefecture or county, e.g., Shangri-la matsutake market	Re-grading, exchange, preparing trade documents, processing, storage, transportation	Dozens to hundreds (150 in Shangri-la Matsutake Market)	1000–20,000 kg	Good road and air connections to large-scale market	Good	Highly regulated
Large scale (export) Market	Normally the capital city of province or strategic exporting point, in this case, Kunming	Fine grading, packing, processing, storage, export	50–60 (20–30 have exportation rights)	>20,000 kg	International airport	Good	Highly regulated

buy harvesting permits from local community authorities.

Middlemen, or those who buy matsutake directly from the pickers, are small, usually local independent buyer-sellers as well as local agents and representatives of larger trading companies. The small buyer-sellers typically buy up matsutake from a small area. A primary grading of the matsutake usually takes place during the initial sale; the matsutake are then sold to bigger buyers or directly to the domestic market. During the harvesting season, trading companies normally send their agents to village level and small-scale markets as well as to intermediate-scale markets in commercial centers. The company agents are usually Han Chinese from outside the area, but in most cases local villagers are employed to act as translators and for the purpose of gaining local trust.

Diqing Prefecture, which is mostly Tibetan and includes Shangri-la County, accounts for nearly half of all the matsutake production in Yunnan (Fig. 2). At the intermediate-scale (regional) matsutake market in Shangri-la, there are approximately 150 trading companies engaged in the matsutake trade. As might be imagined, a great deal of bargaining and negotiation takes place at this market as the companies buy, sell, and re-grade matsutake (into five to seven categories) as well as process and store matsutake products.

Three different governmental authorities tax the matsutake at the county and/or prefecture level: Special Agro-Forestry Products Taxation, Business Administration Taxation, and Plant Quarantine Taxation. All three have offices at the matsutake market in Shangri-la. The companies apply for required trading documents from these offices before transporting the matsutake by night bus or airplane to the large-scale (export) market in Kunming.

In Kunming, there are 50–60 companies involved in the matsutake trade. In most cases these companies buy the matsutake from lower level companies at a price agreed upon before the matsutake leave the Shangri-la market. Therefore, the major action taken at this level is not bargaining, but a final re-grading of the matsutake based on international grading standards. The matsutake are then air-freighted to Japan. In total, it takes two days for fresh matsutake to be transported from the forests of Yunnan to the Japanese wholesale market. Preserved products (salted and dried matsutake) are more commonly exported from Sichuan province than Yunnan and are transported by ground and ship rather than air.

Exporting companies with the legal right to export are generally based in Kunming. Each of the large trading companies has its own matsutake exportation quota determined by the ESIEMO-Kunming office. Some of the exporting companies do not actually involve themselves with the buying and selling of matsutake, but instead sell their exportation quotas to other companies. Each year, 20–30 companies gain the exportation quotas.

Resource Access and Management

Generally the tenure system for nontimber forest products is vague. In Yunnan, forestland tenure was broadly divided into three categories in 1981: state forest, collective forest, and household or freehold forest (Xu and Ribot 2004). Although NTFPs are considered an attached attribute of the forestland tenure, there is no particular tenure arrangement for specific forest products. However, the right to harvest NTFPs can be negotiated based on customary institutions and statutory forestland tenure arrangements among traditional users.

Historically, NTFPs have been harvested across administrative and forest tenure boundaries in northwest Yunnan, either as open access resources or common property when they were consumed locally in small amounts. With the increased market value and large-scale commercialization of NTFPs such as the matsutake and caterpillar fungus (*Cordyceps sinensis* [Berk.] Sacc.), conflicts have arisen. To prevent inter- and-intra-village conflict, new regulations have been put in place at the community or township levels in which boundaries for matsutake harvest are demarcated, usually based on administrative boundaries and customary access. These regulations are generally known as x*iangguimingyue* ("Rural Rules and Norms").

Typically, within each community all villagers have equal access rights. However, there are differences in harvesting practices from village to village. For instance, in many of the villages in Deqin County, it is up to each individual where he or she wants to harvest each day, but in A'dong village a "rest day" is declared at least once a week during which no harvesting is allowed. On the other hand, in Jidi village in Shangri-la

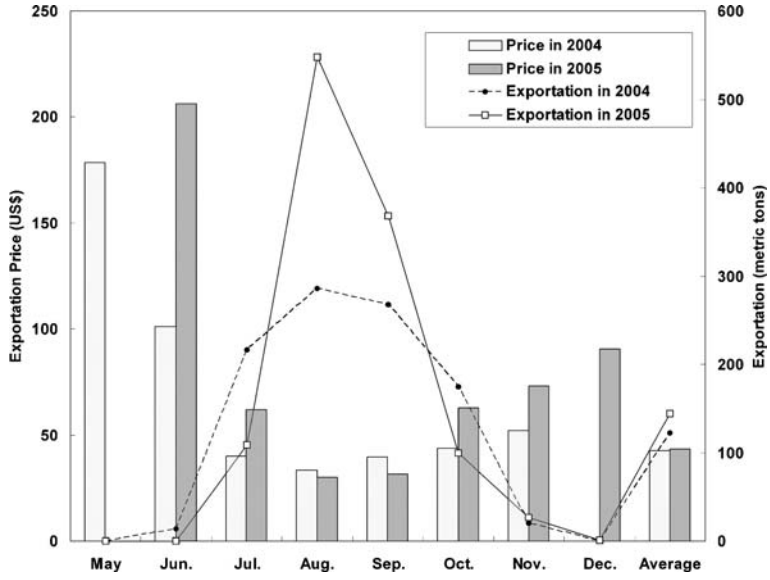

Fig. 4. The relationship between the price (in USD) and quantity (in metric tons) of matsutake exported to Japan from Yunnan.

County, a system of harvest rotation has been developed whereby matsutake production areas are divided into sections and villagers are divided into groups. Each group harvests one section in a day and then moves on to another section the next day, and so on. Since there is a great deal of variation in productivity from one part of the forest to the next, this rotation system ensures that each villager can access the most productive areas equally (but not every day) while mitigating pressure on the most productive areas by controlling the number of harvesters per day. Furthermore, one of the productive areas close to the village has been set aside for elders.

Price, Quantity, and Quality

Matsutake prices vary enormously from year to year, month to month, day to day, and even within one day. Demand from Japan and supply from China and other matsutake-producing countries are the principal determinants of price. Generally, price is negatively related with local production, subject to international supply. This can be seen in Fig. 4: the price is typically highest at the beginning of the season (June), when there are few matsutake in Yunnan or anywhere else. During the height of the season (July–September), the price usually drops dramatically. In October–November, matsutake production declines in Yunnan, but the price recovers only slightly because of high matsutake production elsewhere (Korea, Japan, North America).

Price also varies greatly according to how the matsutake are graded. Grading depends on the size of the mushroom and to what extent it has opened (i.e., whether or not the veil covering the gills has broken), whether or not it is damaged or bug-eaten, and whether it is fresh and fragrant. The highest price categories are for those big in size, not opened, undamaged, bug-free, fresh, and with elegant odor. Conversely, the smallest or oldest individuals or those with obvious defects are graded the lowest.

Table 3. Average Japanese wholesale price (per kg) for matsutake imported from various countries in 2001. Modified from Gong and Wang (2004), using an exchange rate of USD 1 = 118.94 Japanese yen.

	In Japanese Yen	In USD
From Canada	4,914	41
From China	7,459	63
From North Korea	7,935	67
From South Korea	17,074	144

The Japanese wholesale prices for matsutake also differ according to country of origin. Those from Japan are regarded as the best and most expensive, followed by South Korea, North Korea, China, and North America (see Table 3).

Problems and Issues Related to the Matsutake Trade

It is well known that Yunnan is one of the world's most important areas for matsutake production. The free market system and the customary institutions in place have worked well in many respects, but some problems persist. There has been little attempt to restore degraded habitats after logging, protect current matsutake habitat, or enhance matsutake reproduction. One concern is the collection of very small, immature fruiting bodies (shorter than 5 cm) because locating them usually requires digging. Competitive pressure results in large numbers of these baby fruiting bodies being collected for sale, but these are downgraded because they are so small, and overall income is consequently diminished. Regulations exist prohibiting digging or raking up the leaf litter or collecting undersized mushrooms, but these regulations are poorly monitored and implemented.

Matsutake harvest is a very hard and labor-intensive work. Our interviews show that most or all of the laborers in the household spend 5–7 hours a day in the mountains during the harvesting season. The consequences of such intensive searching are unknown. Trampling might have a negative impact on matsutake production by physically destroying the *shiro* (the perennial fungal colony in the ground that produces the mushrooms), or by bringing exotic microbes into local microbial communities.

From the marketing side, the collection and sale of undersized fruiting bodies is also poorly controlled. Most of the matsutake of lesser quality (undersized and damaged or old specimens) are supplied to local restaurants or dried for sale to tourists. There is also no strategic plan for improving the quality of matsutake exports. Quantitatively Yunnan accounts for a significant percentage of the international market, but monetarily it accounts for less than its potential because the quality of what it ships cannot compete with Japan or Korea. The latter countries have an advantage in transportation time, but they also have a superior product because of the greater care taken in harvesting and transporting the mushrooms.

Aside from taxation and quota control, the government does not participate in the planning and systematic management of the resource. To properly manage matsutake in Yunnan requires a comprehensive approach that considers all components of matsutake trade and ecology, including the people. We hope this brief overview and summary of the matsutake trade in Yunnan is helpful in stimulating further research.

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