
Research Article

The Ethnobotanical Survey of Clove, Pepper, and Nutmeg and Their Utilization by Chinese and Indonesian People

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Abstract

An ethnobotanical survey was conducted in the spices market of two provinces of China. This study aimed to describe the survey of spices sold and the availability of clove, nutmeg, and pepper in China and Indonesia markets. The study documented the knowledge of the utilization of pepper, clove, and nutmeg by Chinese and Indonesian people. Different communities based on their perceptions and experience use the same spice plants for many purposes. Unstructured interviews and literature study were also conducted to complement the data. Cloves, nutmeg, and pepper are the three kinds of main spices for the Chinese people. Indonesian people use nutmeg and clove for one particular type of cuisine, otherwise pepper is used in a variety of dishes, to provide a spicy flavour. Due to the medicinal properties of clove and nutmeg, Indonesian and Chinese people use clove not only as a spice but also for medicine. Apart from using it as a spice and medicine, Indonesian people also use nutmeg for snacks.

Keywords: spices, market, flavouring, medicine

Introduction

People use plants for social, cultural and economic needs. Plants are used for purposes of food, medicine, fuel, industry, ornament, ritual, firewood, construction material, and also as spices. There are many forms of spices such as fresh, dried, or frozen; whole, ground, crushed, pureed, as pastes, and extracts (Raghavan, 2007). There are many other uses of spices, to preserve meats or fish, to eliminate disagreeable odours and to disguise tainted foods. Many spices have medicinal properties such as antioxidants, digestive stimulant action, anti-inflammatory, and antimicrobial (Shan et al., 2005). Indonesia also has great biodiversity and diversity of ethnic groups each with their own social life and different cultures. More than 6,000 species of flowering plants, whether wild or cultivated are recognized and utilized for the purposes of

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food, clothing, medicine, protection, and also spices (Walujo, 2011). With the diversity of the tribes that inhabit Indonesia, there are various systems of knowledge on nature and the environment. This knowledge varies from one ethnic group to the other ethnics and depends on where they live, the climate, customs, etiquette, behaviour, and also the pattern of life groups (Walujo et al., 1991). For example, Sumatra people like the food to be spicy, but Javanese people prefer sweet flavours in their food.

China consists of 56 ethnic groups, and each group has traditional knowledge of using plants (Wujisguleng et al., 2012). China is a country with a great diversity of plants, climate and geography. The northern people of China use spices more often compared to southern people. They need spices to warm their bodies. The climate of southern China is warm and humid and rainfall is abundant (Wright, 2011). Northern China is usually relatively dry with less abundant rainfall. The landscape is mostly dry and brown. Dry crops of barley, millet, and wheat grow best in northern China (Wright, 2011). Northern people like a more spicy taste in their food.

Historians have noted that Indonesia is the focus of attention of Chinese, Indian, Arab, and European traders since 300 BC or possibly earlier. They tried to obtain major Indonesian spices of the time, such as cloves (*Syzygium aromaticum* (L.) Merr. & L.M. Perry) and nutmeg (*Myristica fragrans* Houtt.) (TREDA, 2012). By the fifth century, there was also a high demand from China for cloves, nutmeg and mace (all from Mollucas), pepper (*Piper nigrum* L.), (from Sumatra and West Java), as well as rhinoceros horn (from Java and Sumatra) and tortoiseshell (from Bali and elsewhere). (Drakeley, 2005). Clove, pepper, and nutmeg are spices with many uses. These are used for traditional medicine, food, ritual materials, to preserve materials, etc. Indonesia is still exporting clove, pepper and nutmeg to China. Indonesia is a producer of cloves and nutmeg, while pepper is also grown in West Java and Sumatra. White pepper, black pepper, and the nutmeg oil were between 2009 and 2014 major export commodities from Indonesia (Statistic Indonesia, 2015). Most spice products were supplied from East Java which reached 49.1 thousand tonnes (32.17 percent), Lampung which reached 34.7 thousand tonnes (22.74 percent), DKI Jakarta which reached 28.1 thousand tonnes (18.41 percent), and North Sumatra which reached 19.6 thousand tonnes (12.83 percent) (Indonesian Foreign Statistic, Volume I, 2015). Until now, clove, nutmeg and pepper are the common spices used by Chinese and Indonesian people. The ethnobotanical study of clove, nutmeg and pepper by Indonesian and Chinese is conducted to document the knowledge of using pepper, clove, and nutmeg

by Chinese and Indonesian people. The survey of spices was conducted in spice markets.

Methods and Material

Study area

A market survey was conducted in two Chinese provinces that have big spice markets. The first survey of a spice market was carried out in Hebei Province, and the second survey was conducted in Guangxi Zhuang Autonomous Region. The first survey of the spice market was conducted in four small spice shops and one big market that has medicinal material and spices in Anguo City, Hebei Province. Anguo is located at the south of Baoding in Hebei province, North China. The Anguo herbal market is opens from 08.00 to 11.00. There are two floors in this market, the first floor mainly sells spices and on the second floor, medicinal material are sold (Figure 1). The medicinal material is not only from plants but also from animals. The second floor sells spices and medicinal material at higher prices (Table 1).

Table 1. Brief sketch of the spice market in Anguo City

First floor	Spices
Second floor	<ul style="list-style-type: none"> • Medicinal material from plants and animals (higher prices) • Spices (higher prices)



Figure 1. The first floor of the spices market in Anguo City.

The second survey of the spice market was conducted in Yulin City of Guangxi Zhuang Autonomous Region (Figure 2). In Yulin city, we conducted a survey in four big markets, of which two markets solely sell spices. These markets also distribute spices to other provinces in China and also other countries.



Figure 2. The distributor of spices in Yulin City

The third market is the market that usually sells spices packaging. The market is opens between 7:30 and 20:00. In this market, we also found sellers of vegetables, fruits, dried fishes, daily food, tea, and also local food products. The vegetable sellers also sell spices in the fresh form such as ginger, onion, and garlic obtained from Yulin city. The spices sold in Yulin city occur due to several factors, the first one is its location. Yulin is located closer to Southeast Asian countries and people from different provinces and countries visit the city. The second factor is Yulin is traversed by traders or entrepreneurs who come to trade - buying spices before reselling. Usually, spice sellers in this city are those who came from other provinces, such as Guang Dong Province. Local people in Yulin city usually sell the food in some small shops and also sell jeans. Spice selling is done on a larger scale since most people see that selling spices has given them more benefit.

Data Collection

For our data collection, we did surveys and interviews. We also did a literature study on uses of clove, pepper, and nutmeg by Indonesian and Chinese people. The survey was conducted to document spices sold in the market and also the availability of pepper, clove, and nutmeg. The methodological approach was semi-structured interviews with spice sellers. In Anguo City, we interviewed 4 spice sellers at random. In Yulin City, we also did random interviews. In the first spice market, we interviewed 5 spice sellers (2 women and 3 men). In that market, some sellers sell their products directly from home so they do not have to come to the market. In the second market, we interviewed 19 spice sellers by random. Interviews and discussions were undertaken based on questions prepared in English and translated into Chinese. We also collected data about spices in Indonesian markets from literature and did surveys in traditional markets.

Data Analysis

Based on interviews, we produced graphics on the types of spice sellers and their knowledge about the spices. We describe the types of spices sold in the market, how the sellers get the spices, and the use of clove, pepper, and nutmeg by Chinese and Indonesian people. We also analyzed data based on ethnobotany views.

Results

From the interview, we know that some spice sellers know a lot about spices but do not use spices while some know much about spices and use them in their daily lives (Figure 3). Spice sellers received knowledge from their parents, friends, and also from their experience. There are several types of the spice sellers in the market that we visited. The first one is sellers who sell only one kind of spice or the main spices. This is based on the high sales value on those spices as people often use these spices. In other words, there is possibility of the prices of these spices continuing to increase. The second type of the sellers are spice sellers who sell spices produced by their hometown, making it easier to get the spices. They usually sell pepper from Hainan Province. The third type are spice sellers who sell not only the spices but also the medicinal materials (Figure 4).

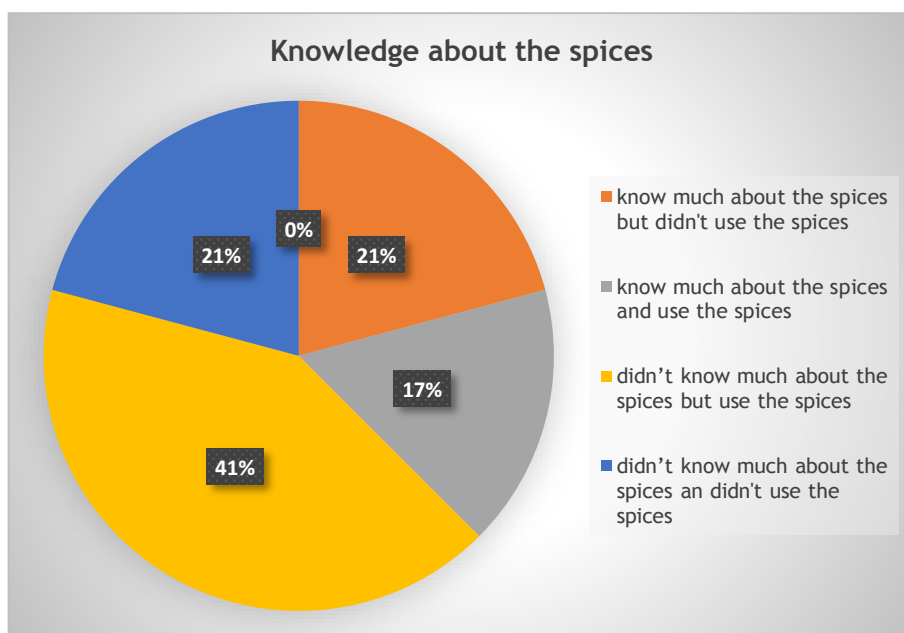


Figure 3. The graphic of knowledge about the spices

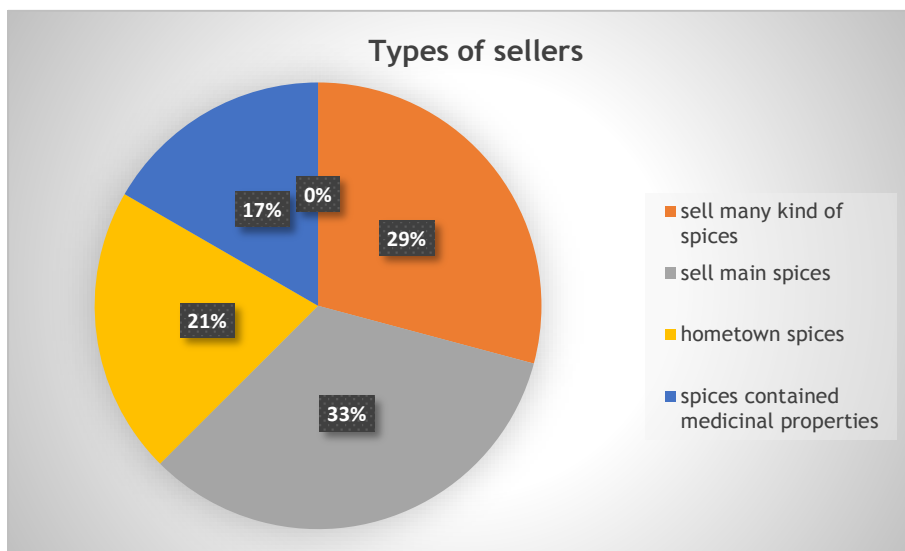


Figure 4. Graphic of types of spice sellers

In China, most spice markets sell spices in the dried form (Figure 5). These dried forms are most frequently used as processed products. The spice sellers also cooperate with medicinal material companies, because these spices can be used as medicine. The spices purchase will be crowded before the Spring Festival. People and restaurants will come to prepare food for the Spring Festival. In Indonesia, spices are sold in the traditional market. The market sells other household needs such as vegetables, meat, fruits, etc.



Figure. 5 Spices sold in Chinese spice markets

The spices sold in Indonesia market are mostly in fresh form. There are also some spice sellers who sell in the dried form. Most spice sellers also sell milled fresh and dried spices. One combination of spices is used specifically for one dish. In Indonesia, purchase of spices will spike before the Idul Fitri and Christmas celebrations. Customers are diverse, ranging from housewives to those who do catering and at food stores to restaurants. There are several methods of how spices are sold in markets. Most farmers will sell spices to a merchant who collects these. When merchants start running out of stock or when prices start to increase, they will directly come to the farmers. The price is determined by the merchant.

In the Chinese spice market, cloves, pepper, and nutmeg are some of the main spices. The other spices that can be found are star anise (*Illicium verum* Hook.f.), ginger (*Zingiber officinale* Roscoe), cinnamon (*Cinnamomum cassia* (L.) J. Presl), cumin (*Cuminum cyminum* L.), citrus skin (*Citrus* sp.), Szechuan pepper (*Zanthoxylum* sp.), long pepper (*Piper longum* L.), cardamom (*Amomum* sp.), aromatic ginger (*Kaempferia galangal* L.), and turmeric (*Curcuma longa* L.). These spices are mostly sold in spice and herbal markets. Based on survey results, nutmeg is imported from Indonesia; clove imported from Indonesia and Africa, while pepper is imported from Indonesia, India, Malaysia, Vietnam, and also brought from Hainan Province, China. The shade of cloves from Indonesia is darker than those from Africa. The stems of cloves are also imported from Indonesia. The reason for importing spices directly from Indonesia is due to the need for Indonesian spices. To import spices from Indonesia, there are people who will connect them with the spice distributors in Indonesia. Some spice sellers also come directly to Indonesia to find spice distributors.

Chili (*Capsicum annum* L.), pepper (*Piper nigrum* L.), nutmeg (*Myristica fragrans* Houtt.), shallot (*Allium cepa* L.), garlic (*Allium sativum* L.), ginger (*Zingiber officinale* Roscoe), turmeric (*Curcuma longa* L.), coriander (*Coriandrum sativum* L.), aromatic ginger (*Kaempferia galanga* L.), clove, candle nut (*Aleurites moluccanus*) are the spices mostly sold in the Indonesian market. The spices are mostly used in daily cooking. There are more variants of spices in the big traditional market, for example in Pasar Induk, Kramat Jati, East Jakarta or in Pasar Senen, Central Jakarta. Spices include cardamom, caraway (*Carum carvi* L.), cinnamon, nutmeg, mace and clove. The spice sellers also import cardamom from India and cinnamon from China (KOMPAS, 2014). In small traditional markets, clove and nutmeg are usually sold in small quantities. Many kinds of spices are sold such as ginger, nutmeg,

white pepper, onion, garlic, chili, turmeric, cumin (*Cuminum cyminum* L.), aromatic ginger, etc. They sell not only spices but also other household needs, such as vegetables and foodstuff.

In general, there are middlemen or stores that collect spices from farmers and sell these in markets. The most expensive spice in the Chinese spice market is pepper and the most expensive spice in the Indonesian market is clove. In the Chinese and Indonesian markets, cloves, pepper and nutmeg are some of the main spices with high demand. The availability of spices sold in the market is influenced mainly by the needs of the community and because of good sales of these spices. Sale is related to profit and if certain spices have stable prices, then these spices will be sold.

Discussion

Cloves, nutmeg, and pepper are the three kinds of main spices for the Chinese people. Indonesian people use nutmeg and clove for one particular type of cuisine, otherwise pepper is used in a variety of dishes, to provide a spicy flavour. Chinese people use cloves, star anise, and citrus skin to eliminate fishy smell in meat dishes. Clove oil can also be used as a natural preservative, it is associated with the usage of spices in the past by the Europeans during winter. Traditionally, the use of spices as a natural preservative is by immersing or smearing it on meat or processed meat. Utilization is usually in the form of a combination of several kinds of spices. Cloves are generally picked by hand, using a ladder or pole of bamboo. It takes four years for clove to mature for harvesting from the time it is planted. Harvesting is done by picking the flower stalk, then putting these in a basket. The age of flower should be old enough and yet in bloom.

Clove is the most expensive spice sold in Indonesia since it is used by many companies as an ingredient of 'Kretek' cigarettes. Kretek are cigarettes with combination of tobacco, cloves and other flavours. Unlike the use of cloves by Chinese society, Indonesian people use cloves for one particular type of cuisine, especially in meat dishes such as 'rendang' and stews. 'Rendang' can last a long time, this is related to the use of cloves as a natural preservative.

As a medicinal material, clove has been used mainly for dental health. This is in line with the days of the Han Dynasty, where the Chinese people were instructed to chew on cloves. Tolaki and Toraja people in Southeast Sulawesi, Indonesia use clove to heal toothache. It is dried and affixed directly on the

sore tooth (Sihotang et al., 2011). Communities in Trunyan village, Bali, use clove and its leaves to treat shortness of breath, fever and tingling. The ethnic of Sunda in Bodogol area, West Java also use clove as medicine for toothache (Sihotang, 2011). Clove is one of the spices with the highest antioxidant capacities. It has potential to be exploited as a natural antioxidant for commercial purposes. Clove contains a high level of phenolic (Shan et al., 2005). Phenolic compounds in these plant materials are closely associated with their antioxidant activity (Shan et al., 2005). Clove oil can also be used as raw material for the manufacture of balsam. Balsam cloves can relieve pain, especially rheumatic pain. In addition, clove also relieves indigestion and vomiting. It is also used in medicinal preparations for asthma, arthritis and sprains

The ground nutmeg which is directly from nutmeg seeds is used for flavouring food. To retain its flavour, nutmeg is usually added in the end of cooking. Some people prefer mace in their cuisine. By using mace, cuisine could be cleaner. In contrast with nutmeg, the food will seem a bit murky. In drying nutmeg, farmers still use a traditional method through which they dry it in the sun for 4-5 days, depending on the level of dryness or moisture, on plastic bags, jute sacks, tarps or cloth material. The use of sack or cloth is to keep the temperature normal. Mace is dried in the sun for a few hours then aerated. It is done repeatedly until the mace is completely dry.

Chinese people use nutmeg in hotpots which is part of Chinese culinary culture. To improve taste and smell of hotpots, spices are always added (Wu, et al., 2012). The Chinese people also consider it to be an aphrodisiac. In Indonesia, nutmeg seed is used for stews, sauces and curries. Nutmeg is used to add a spicy flavour in food, and is able to help warm the body. Nutmeg has religious significance for Maluku people. The nutmeg seed is placed around the neck of a person who is seriously ill and God is then asked to heal the person and decide the person's fate (van Gills, 1994).

Nutmeg has 6.5% to 16% essential oil (Asgarparnah & Kazemivash, 2012). Mace has 7 to 14% essential oil and about 30% fixed oil (Raghavan, 2007). Because of that, Maluku people rub the oil all over their bodies to keep themselves warm. Nutmeg oil is also rubbed on the abdomen to relieve stomach aches and on the forehead to alleviate headaches (van Gills, 1994). The Iboih people in Aceh use nutmeg as a medicinal plant for treating headaches (Susiarti, 2006). Since ancient times, nutmeg and its oil were used in Chinese and Indian traditional medicine for illnesses related to the nervous and digestive systems. In China,

nutmeg seeds are crushed into a powder and used as a remedy for dysentery in both children and the aged (Mitra et al., 2007). The nutmeg candied fruit also popular as a snack. It can be made into wet candied nutmeg or dried candied nutmeg. In Maluku it is called 'pala gula' (literally, sugar nutmeg), the result of the drying process. In Java it is called 'pala manis' (literally, sweet nutmeg) a sweet candy made from the nutmeg rind.

The bite and pungency in black and white peppers is primarily due to the nonvolatile alkaloids, piperine and chavicin. Piperine contributes to the hotness of pepper (Raghavan, 2007). The pepper-producing areas in Indonesia are Lampung, Bangka Belitung, East Kalimantan and West Kalimantan. Pepper from Lampung province is known as Lampung black pepper and pepper from Bangka - Belitung is known as Muntok white pepper. In the tropical agricultural regions of China, black pepper is one of the important cash crops. Hainan province, a major producer and exporter of black pepper in China, produces 36,000 mg of pepper berry annually and has 22,000 ha in cultivation (C. Zu et al., 2014). It was introduced into Hainan in 1947 from Indonesia (Jiang & Liu, 2011).

Pepper is the most expensive spice in the Chinese market as it is widely used in cooking and also used by fast food restaurants. In addition, pepper is purchased by companies that produce seasoning and food packaging. Chinese people use pepper in cooking beef and dog for flavouring the taste and eliminating the fishy smell. Pepper is one of the instant seasonings for cooking dogs and ducks in Chinese five-spice blend, which consists of *Aidia cochinchinensis* Lour., cumin, star anise, citrus skin, and pepper. It is also included in the instant seasoning (five-spice blend) for cooking fish consisting of chili, white pepper, star anise, cumin, and aromatic ginger. Pepper is also included in the ten-spice blend consisting of star anise, cinammon, Szechuan pepper, citrus skin, clove, white pepper, lesser galangan (*Alpinia officinarum* Hance), fennel (*Foeniculum vulgare* Mill.), and shallot (spring onion). This combination is used for vegetables, meat, dumplings, sausages, soup, and pickles. Additionally, pepper is also used in Chinese hotpot (Wu et al., 2012).

Pepper is a spice that is mostly used in Indonesian cuisine and gives a little taste of hot or spicy in dishes. White pepper is very commonly used as a mixture for cuisine. Generally, pepper is used at every soup meal. The combination of pepper, ginger, and cinammon is used for flavouring the taste of fish, vegetables and meat. The combination of cinnamon, nutmeg, cloves, and pepper is used as a seasoning for stews. The Dayak Iban tribe in West

Kalimantan use the roots and seeds from pepper to treat back pain and to recover after childbirth (Meliki et al., 2013). The Seram people also use and drink the mix of pepper fruit, brown sugar, and egg yolks for three days to recover after childbirth (Susiarti, 2015). In Southeast Sulawesi, the Maronene tribe of Rau-Rau village use pepper to treat the disease of vomiting blood (Salibu & Ompo, 2014). The Malay ethnic people of Serambai village in Sanggau, West Kalimantan Indonesia use pepper fruit to cure toothache (Sari et al., 2014).

Conclusion

Spices for sale are related with demand of these spices. The availability of spices in the market is affected by the demand of the spices, their stable prices and also the continuous availability of spices. People have developed knowledge and methods to utilize spice plants. The utilization of spices is part of ethnobotanical information. Based on perceptions and experiences, the different communities in countries across the world have their own knowledge in spice plants to be used with different food. Cloves, nutmeg and pepper are the three kinds of main spices for the Chinese people. Indonesian people use nutmeg and clove for one particular type of cuisine. Because of the medicinal properties of clove and nutmeg, Indonesian and Chinese people use clove not only for spices but also for medicine. Indonesian people also use nutmeg for a snack called 'pala manis'. Both Indonesian and Chinese people use pepper in a variety of dishes, to provide a spicy flavour. Pepper is also included in Chinese spices blend specifically used for meat and fish dishes.

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