EXPERIENCES IN BENZOIN RESIN PRODUCTION IN SUMATRA, INDONESIA

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Introduction

Data presented here are the preliminary results of research on benzoin in North Sumatra by two projects dealing with non-timber forest products in Indonesia[1]. It was decided to study benzoin among other products, because of its interesting management, and because very little data was available on present exploitation. This product has been used, exploited and traded for several centuries, but historical information is sparse. Colonial foresters led some work at the beginning of this century, but little interest has been shown in non-timber forest products from that period until very recently. Exploratory fieldwork was initiated in October of 1996 and new members of the team will start their research at the beginning of 1998. So this paper will raise questions rather than provide answers.

Benzoin is the resin of various species of *Styrax* trees *(Styracaceae)*. One group of species, as described below, is distributed throughout Sumatra and Peninsular Malaysia, and may be in Java and Bali. As will be observed later, its production is over 1000 tonnes/ year. Another group of species is found in continental South-East Asia.The main resin producing species is *Styrax tonkinensis* (Pierre) Craib ex Hartwiss (Pinyopusarerk, 1994) and *Styrax benzoides* Craib. is a minor one (Burkill, 1966). It is known as 'Siam benzoin', as it was traded through the kingdom of Siam (present Thailand). Chinese historical data suggest that it was first exploited and traded from North Sumatra, in the 8th-9th centuries. From about the 12th century, it also came from continental South-East Asia, where its names seem to be derived from Indonesian languages (Yamada, 1954-55; Wheatley, 1959). In Sumatra, it is called *kemenyan* in Malay and *haminjon* in Batak (the Malays inhabit the coasts and the Eastern part of Sumatra, the Batak the highlands of North Sumatra). The Thai, Lao, Khmer and

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[1] CIFOR project 8, directed by Manuel Ruiz Pérez, on "Global trends in non-timber forest products" and European Union project, directed by Geneviève Michon, on "Alternative strategies for the development of forest resoures: extractivism, agroforestry or plantations?". EU project involves French, Spanish and Norwegian, Indonesian and Filipino research institutions and NGOs. CIFOR and EU projects are interacting and overlapping, and some scientists, such as Esther Katz, are members of both.

Vietnamese names are close to *kemenyan* (for instance *nhan* in Lao) (Yamada, 1954-55). The word 'benzoin' and its equivalents in other European languages derive from the Arabic *luban jawi,* 'frankincense of Sumatra', as it was brought to Europe through the Arab world[2]. Benzoin is chiefly used for incense, perfume and medicine.

We thought that benzoin in North Sumatra had become a very minor activity, yet we found that it is still produced in fourteen sub-districts distributed over two districts, Dairi and North Tapanuli, where it is either the main source of income, or secondary to commercial agriculture (coffee, pineapple, etc.). Thousands of farmers and small local traders still live from this resource.

Species identification

Although benzoin resin has been known for a very long time, the identification of benzoin resin producing *Styrax* trees in Indonesia is not yet totally accurate. Different species of *Styrax* grow all over the island of Sumatra, at least from Aceh to Jambi (and are also found in Peninsular Malaysia). Most authors describe *Styrax benzoin* Dryand. as the best resin producing species (Braam, 1917; Heyne, 1927; Hulssen, 1940; Burkill, 1966; Pastorova & Boon, 1994). The second most important species is *Styrax paralleloneurum* Perk. (Hulssen, 1940, Pastorova & Boon, 1994), but Watanabe *et al*. (1996) consider it a better species and believe it to be the same as *S. sumatranum* J.J. Smith (mentioned by Burkill, 1966), which may also be another name for *S. sumatrana* (mentioned as a secondary species by Heyne, 1927). Burkill (1966) also describes *S. subpaniculatum* Jungh. & De Vriese which grows in Palembang area, in the South of Sumatra, and *S. serrulatum* Roxb. The taxonomy of *Styrax* species has been revised since Burkill's work, but unfortunately no ethnobotanical information is provided in this revision (Putz & Ng, 1978). Heyne (1927) collected samples, local names and ethnobotanical information at the beginning of the century, which needs to be compared with present data. Batak peasants distinguish two or three species of benzoin trees, with different qualities of resin, but we have not collected all the species, nor identified them. The names and number of species vary according to the areas. Local names have been given to us in Batak Dairi in Dairi district and in various dialects of Batak Toba in North Tapanuli, which are two different, although closely related, languages.

Chemical composition

Some information is available on the resin chemical composition of *Styrax tonkinensis* ('Siam benzoin'), *Styrax benzoin* and *Styrax paralleloneurum*. Siam benzoin is more valued for pharmaceutical preparations and for perfume than Sumatra benzoin. According to data compiled by Burkhill (1966), *Styrax tonkinensis* and *Styrax benzoin* both contain benzo-resinol and traces of three fragrant substances, benzaldehyde vanillin, phenylpropyl cinnamate styrol, and styracin; but *Styrax tonkinensis* contains free benzoic acid, while *Styrax benzoin* contains free cinnamic acid and holds lower quantities of vanillin and styrol; *Styrax paralleloneurum* yields a benzoin made up principally of cinnamic acid. A recent study was made on samples of different qualities of *Styrax benzoin* and *Styrax paralleloneurum*

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[2] The first Arab travellers called both Java and Sumatra 'Jawa'.

collected in North Sumatra (Pastorova & Boon, 1994). From the gas chromatograms, they identified six groups of components in all the samples: free benzoic acid, free cinnamic acid, free alcohols and vanillin, benzoic acid esters, cinnamic acid esters, higher molecular weight compounds. They conclude that quality of both the resins is correlated with the aromatic ester content. *Styrax paralleloneurum* contains primarily cinnamic acid esters and *Styrax benzoin* about equal amounts of cinnamic and benzoic acid esters. Lower grades contain mainly free benzoic and cinnamic acids and an amount of triterpenoids. It is very likely that the different species of Sumatra benzoin are mixed by the collectors and the traders.

Tree management

Data about the natural distribution of *Styrax* trees has also to be compiled and revised. In Sumatra, they can be found in the undergrowth of primary forests (Laumonier, 1991), but are more common in secondary forests (Laumonier, pers. com.), which is also the case in Northern Laos (Vidal, 1960).

In Indonesia, as we have already mentionned, resin production is centered in the highlands of North Sumatra, where its cultivation seems to have originated. Benzoin was also extracted for local uses in Kerinci Seblat National Park (Aumeeruddy, pers. com.), in Jambi (Laumonier, pers. com.) and maybe in other parts of Sumatra and Central Java. According to Dutch forestry literature, it was also traded from Palembang (Heyne, 1927). We do not know if this is still the case.

Most of the North Sumatra production presently comes from planted trees. They are usually cultivated at elevations from 800 m to about 1500 m. Farmers say that wild benzoin trees can be found in the forests located far away from the villages. We have not been in any of these forests. As this environment has been managed over many centuries, we wonder whether these trees are really "wild". An ecological study will be undertaken at different vegetation gradients and will probably provide answers to these questions.

Most of the farmers we have interviewed so far plant benzoin seeds, or preferably seedlings, inside the forest, usually in a place where there are already benzoin trees. They pick seedlings around the best resin producing trees in their plantation. When the benzoin trees reach about one meter, they progressively eliminate the other species. After eight years, they start tapping the benzoin trees. If they do it properly, they can extract the resin for about sixty years - this means that the farmer, his son and his grandson will live on it. Then they abandon the site and let it grow as a forest. They say that they cannot replace the trees one by one, as it is done in Southern Sumatra, in damar plantations *(Shorea javanica)* (Michon & Bompard, 1987). This plantation method was reported at the beginning of the century by Heyne (1927), but plantations have also been described in abandoned rice fallows (Braam, 1917; Heyne; 1927; Marsden, 1986)[3]. This practice is apparently much less common nowadays. According to farmers in Tapanuli, the trees produce resin only after 20 years, compared to 8 years under forest cover.

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[3] In Laos, benzoin trees grow spontaneously in rice fallows (Savathvong *et al*., 1997)

The history of benzoin cultivation will have to be traced. Plantations were observed by a British traveler as early as 1772 (Marsden, 1986), but we do not know when they were established. No foreign traveller reached the highlands previously, as the Batak fiercely defended their territory. As there was an external trade demand from the 8th century, intensification of the production may have happened several centuries ago, but was probably expanded a few generations ago. In 1917, Braam (*op. cit.*), observed that a lot of planting had occurred in the few preceding years. We do not know either what has been the proportion of cultivated trees to 'wild' trees over the centuries. Marsden *(op. cit.)* saw wild benzoin trees, but it is difficult to know what was really wild, favoured or managed in the forest. We still have to study the difference between wild and cultivated benzoin trees and better understand the method of selecting seedlings. We need to recognise, in any case, that the Batak farmers started planting and selecting the trees at a time when there was no scientific agronomic research and that the indigenous knowledge of benzoin has been built up over centuries.

Presently the benzoin farmers are facing problems of land limitation. Their plantations are getting old and forest spaces have been reduced to the minimum. A big pulp and paper company located in the area is in great need of wood. This company has already cut hundreds of hectares of pines which were planted in colonial times and have been planting eucalyptus trees. In some villages, they have cut benzoin plantations or are planning to do so and replace them with eucalyptus. This is quite a paradox, because in Vietnam, *Styrax tonkinensis* are planted for pulp and paper (Pinyopusarerk, 1994). Young farmers also voluntarily sell their benzoin trees and turn to other activities. Many older farmers' sons have migrated to the cities. These farmers have no reason to set up new plantations, and when they are too old to work, they abandon their plantation or sell it. The price incentive to retain benzoin is very low at the moment. Prices on local Sumatra markets have not increased for several years, which means that in real terms, they have been decreasing. Both farmers and traders are worried about the future[4].

Tapping techniques

During the peak seasons, farmers whose main activity is benzoin exploitation go to their forest plantations for about three to five days per week and return to the village for the weekly market and church. Benzoin exploitation is usually a male occupation. It is hard and risky, as it requires the tapper to climb up the tree to 4-6 meters. The bottom of the tree is tapped or harvested first, and then a rope of sugar palm fiber is tied at about 2 meters above the ground. The tapper stands on a small piece of wood tied to the rope to tap or harvest the second part of the tree. This is repeated at the next 2 meters, and so on if necessary. Only a few women exploit the trees to help their husband or because they are widows, and this does not occur in all the villages. The benzoin tree itself is perceived as a woman and the resin is seen as her tears or her milk. Before going to their plantations, the farmers must be nice to their wife and while tapping, they must not talk in a coarse manner, otherwise the 'lady tree' will not give resin.

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[4] In Laos, farmers located close to roads have turned to other alternatives. Only farmers located in marginal remote areas still tap benzoin trees (Chagnaud, 1996; Savathvong *et al.,* 1997).

Before tapping, the bark has to be cleaned of mosses with a scraper *(guris)*. This way, the resin will not mix with impurities when it flows out, and the sun shines directly on the trunk, warming it. Farmers say that the moss keeps it cool and that the tree produces more resin if it is warm. A type of a knife *(agat panuktuk)* is used to open a small wound of about 2 cm in the bark. The metal goes under the bark and lifts it up, then the farmer pushes it back with the knife handle, shaped like a hammer. This way, more resin will remain under the bark. They make about 10 wounds on each two meters level of the tree, 5 on each side, so about 30 wounds are made on a tree. The tapping starts in May and lasts about until August, depending on the number of trees to tap. Only the trees with a full foliage can be tapped. The trees which have lost their leaves or have very young ones (they are called *susang)* have to be tapped later, between January and March, once their foliage has recovered.

The resin flows under the bark and outside. It can be collected after three or four months, from August to about December, for most trees, and from April to June for the *susang*. It is better to collect it in the rainy season, because the weather is cooler and the resin does not melt, but if it gets wet while collecting, it becomes dirty. Collecting should be avoided in the middle of the day in the hot sun, as it is also likely to melt. The farmer uses a small blunt broad bladed knife *(agat)* to pry away the bark to which the resin is stuck. He puts it in a basket carried on his back. A farmer can collect about 5 kg/day, which gives about 3 kg of pure resin. This first flow resin is called *takasan,* the inner white resin is called *mata dalam,* the outer yellowish resin is called *mata luar*.

Two or three months later, the farmer can go back to the same tree and collect the second flow of resin from the wounded bark. He just scrapes it from the tree with the same knife. This resin is called *lecet*. Part of this resin is white, and part a dark brown colour, described as 'black' by local people. As the resin flows on to the tree trunk, some impurities are collected. It dries less easily than the first-flow resin[5].

Then, about three months later again, a third flow of resin can be collected. Usually, while farmers collect it, they tap the tree in another part of the trunk. More commonly, they tap on the side opposite to the last wound. This third resin, called *tahir* or *jurur,* is also dark. It looks like the dark parts of the second resin, but some of it can be slightly reddish and more transparent. Data about the average annual resin production per tree vary between 200 g/year /tree and 1 kg/year/tree. It depends on the age of the trees. Watanabe *et al*. (1996) mention a production of 1 kg/year/tree for fully producing trees.

Drying, commercialization, sorting, processing and transportation

Some people sell their harvest directly with the bark, while others prefer to dry it for a week, in a dark cool place, usually an attic, before cleaning the resin from the bark. If the farmers have enough money, they dry the resin a little longer, at it increases the value. Otherwise, they sell it right away to the local village traders. The barks can be sold separately in large quantities for 3 cents/kg. The prices for resin vary from $2 to $4 according to quality. This trader sorts

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[5] Laos benzoin is only harvested once and only gives white resin (Pinyopusarerk, 1994).

the different types of resins according to their colour and size and dries them for a longer time. For instance the second resin is both white and black. He may extract the white pieces and put them with the resin of first quality and gain some profit on it. He sieves the benzoin and separates it into heaps of different sizes, called 'big pieces', 'bean', 'corn', 'rice', 'dust'[6]. If he holds enough capital, he keeps the benzoin drying as long as he can. The drier the benzoin, the easier it is for transportation. When enough benzoin has been accumulated, the trader or his wife goes to the nearest trading town to sell it, usually on market day. He or she has to go very early so that the resin does melt with the sun or the heat. They transport it in cardboard boxes or big baskets on the top of buses. On one occasion, we observed a village trader who could not catch an early bus, as they were crowded, and whose benzoin melted on the way. As he arrived into town, all the pieces were stuck together, altering the shape and the colour. The selling price consequently dropped. Maybe means of transportations could be improved in order to preserve the quality of the benzoin.

In the market town, the traders again mix the different qualities. They place the smaller size pieces in the bottom of the heap, then bigger ones over it and the biggest ones on top. The trading game consists for the buyer in evaluating the quantity of each size and the profit that can be made on the whole heap. The buyers go from one heap to the other, take pieces from the bottom and lift them up to the top; pick a sample to evaluate the proportion of each size; burn a small piece of resin on their cigarette to smell its fragrance; look at its appearance and its shine. They bargain the price with the seller until reaching an agreement or leaving it. Occasionally sellers do not find adequate buyers and return home with their heap, especially if they are based in that same town.

The bigger traders again sort out the different sizes and qualities and dry the benzoin longer. They keep it about four months before they sell it to distant places: Central Java, located at four days drive, and Singapore, reached by boat from Medan harbour within about a day. Drying and stocking the benzoin requires again to hold enough capital to be able to wait for a few months. The longer traders keep Sumatra benzoin, the drier and the more valuable it is. In contrast, Laos benzoin, which seems to dry faster, must be sold as quickly as possible to preserve its fragrance (Fischer, personal communication). It is possible that Sumatra benzoin also loses its scent in the process, but if it does not dry properly, the product loses more of its quality. We wonder whether all the different manipulations of sorting the pieces by sieving, mixing them again and sieving them again do not also alter the quality[7].

Some benzoin is sold pure, but a bigger proportion is processed. Possibly some processing occurs in Sumatra, and some in Singapore, but most of the benzoin is transformed in Central Java. There, it is wrapped in little plastic bags, pressed into blocks or put into cigarettes.

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[6] In Singapore, the traders use three main categories: 'almonds' (for big pieces), 'siftings' (for small pieces), 'dust'.

[7] This question was also raised by Chagnaud (1996).

In some cases, blocks may be made out of pure benzoin, but more commonly, benzoin is adulterated with damar resin *(Shorea* spp.*),* which is cheaper[8]. Some Batak traders also mentionned that it was going into glass and textile industries, and it may also be processed in Indonesia in flavouring, perfume and essential oil industries, but we do not have any information about it yet.

Uses and trade

The present trading channels of benzoin still have to be accurately researched. According to official regional figures, present production in North Sumatra would be of about 5,000 T/ year, of which 1,000 T are exported[9]. We do not know whether it includes only exports from Sumatra or also from Java and if they are reliable. Another official source gives similar figures (800-1,100 T) for benzoin exports from Indonesia to Singapore (about 90%), Malaysia, Taiwan, United Arab Emirates, Kuwait, India, Hong Kong, Pakistan, Japan, Saudi Arabia (Silitonga, 1994, quoted by Coppen, 1995). In 1920, the district of Tapanuli alone was producing 2,000 T/ year (Schnepper, 1923). In 1931, 2,500 T/ year were exported, to Singapore, India, Arabia, Egypt, Algeria, Europe and America (Koppel, 1932). It is very difficult to trace benzoin exports to other countries, as their figures are not large enough to warrant a separate category; they are included in the "gums and resins" category. We have not checked the current figures, but our estimates, based on two field trips, indicate that the North Sumatran production falls within an order of magnitude of thousands of tonnes. If it really is 5,000 T, we wonder how 4,000 T are consumed by the national population of Indonesia, even though there are 200 million inhabitants.

The use of benzoin has a long history in Sumatra, since it was already exported from there in the 8th century. Its oldest uses may be associated with shamanistic rituals. Even today, shamans in the Batak highlands, as well as in all Sumatra and Java, burn benzoin incense when they enter a possession trance in curing rituals. It is widely used in both islands in different types of traditional rituals : protection from bad spirits, rice-reaping ceremonies, rain rituals, offerings to the dead, to the house spirits, etc. Benzoin is also taken as a medicine and smoked in cigarettes, sometimes also used in rituals. The habit of smoking benzoin cigarettes is very much ingrained in Central Java, where rituals involving the use of benzoin incense are more common and frequent than anywhere else in Indonesia. We estimated the sales of a small retailing stand in the central market of a main city in Central Java to be;a minimum figure of 5 T/ year. The enquiry needs to go further to estimate the local consumption in that region. Some small local industries still make benzoin cigarettes, but these cigarettes, whether industrial or home made, are now smoked only by older people of Javanese peasant background. Industrialists expect it to die with the passing of this generation (Tarmidi, 1996).

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[8] We saw that benzoin used to be adulterated by frankincense or myrrh. We don't know when it started to be adulterated by damar, but it is mentioned at least in the early fourties (Hulssen, 1940). At that time there were processing factories on the west coast of North Sumatra.

[9] Informasi Pasar Industri Produksi Lokal Jenis Tanaman Kemenyan di Kabupaten Tapanuli Utara, 1993-94, data collected by J. Coppen in April 1997 at North Sumatra Forestry Service.

Nevertheless, it is possible that benzoin is also added as a flavouring to some brands of modern *kretek* clove cigarettes, what would imply large quantities since 140 billions of *kretek* cigarettes were produced in 1993, mainly for the national market (*ibid*.). In a modern fast-changing Indonesia, traditional Javanese rituals involving benzoin, practised since pre-islamic times, are now perceived as backward and are rejected by orthodox Muslims. So this consumption has been declining and is likely to decrease even more. Nevertheless, in the rest of the Muslim world,[10] benzoin is widely used and burnt in homes and mosques, in many religious and life cycle rituals, as well as to chase away bad spirits. In the Maghreb, in particular, its use is very frequent. They always use block benzoin.

As early as the 8th century, benzoin was discovered in Sumatra by Middle-Eastern traders who, as noted earlier, called it 'frankincense of Sumatra' and imported it to be used in a similar way or in association with frankincense and myrrh. Around the 12th century, Arab merchants began shipping frankincense from the Hadhramaut ports (present Yemen) to the Sumatran harbour of Sri Vijaya, from where they were trading it to China. They were also shipping benzoin to India and the Middle-East for adulteration with Indian *gum-gugul* [11] and Arabian frankincense, prior to carrying back to the East for sale in China (Wheatley, 1959). At that time, the Chinese were mainly using it as a means of fixing the aroma of more volatile perfumes, and not yet as a medicine *(ibid.)*. They probably also included it in their incenses, as did neighbouring countries such as Japan and Vietnam.[12] The Christians too were using frankincense and myrrh for religious purposes, which, according to the Bible, were brought by the Three Wise Men to Jesus. They also received benzoin from the Arabs, probably in the Middle-Ages, and added it to the earlier incenses. A study in France showed that the use of incense declined in Catholic churches, but is still very important in oriental churches (Goloubinoff, 1997).[13] It seems to be more widely consumed in countries where there are still big Catholic processions, such as in Spain. Benzoin is still used in Western pharmacopeia, in particular for respiratory ailments, but in small quantities. It is employed as well in the perfume industry, as a fixative for more volatile scents and to give a sweet "oriental" note. The quantities involved in this industry are not very great either (about 1-10 T/ year for small and middle-sized companies). In the pharmacy and perfume industries, Siam benzoin is actually more valued than Sumatra benzoin, but perfumers mix both resins to reduce the costs, since Siam benzoin is more expensive. In Marseille harbour, in 1997, the price of pure Sumatra benzoin was between $6 and $18 according to quality, and Siam

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[10] It includes at least the Middle and Near-East, the Indian sub-continent and the Northern part of Africa, from the Somali and Swahili coast to Senegal.
The results of archeological excavations presently led by a French-Indonesian team in Barus, a historical harbour of North Sumatra, will provide more accurate data on the history of the benzoin trade. Disperse data on benzoin historical and present uses and trading channels will have also to be gathered.

[11] *Gum-gugul* is probably a *Commiphora*.

[12] Japan in particular has developped an "incense culture". Incense ceremonies, similar to tea ceremonies, are still practised nowadays (Kobayashi, personal communication, 1997).

[13] In the city of Paris, the consumption of incense would not exceed 400 kg/year in the Catholic churches, and 75 kg/year in the Oriental churches. As they are incense mixtures, benzoin is only a part of this amount (Goloubinoff, 1997).

benzoin was $27. Curiously, several perfumers we visited did not seem to have access to the highest qualities of Sumatra benzoin almonds.

With new esoteric and 'green' trends, there is a recent development of the use of incense in the Western world, which is actually a return to old traditions. The study in France showed that small quantities are sold, but at high prices. Adulterated benzoin is often sold under the name of 'benzoin' or 'Sumatra benzoin' in small 50 g bags, for prices from $50 to $165/ kg. In two places, 50 g bags of pure benzoin siftings (worth $8 /kg in Marseille) were sold for $215/kg under the name of 'Tibetan incense', 'for deep meditation' (Goloubinoff, 1997). As far as we know, Tibetans make incense out of Himalayan plants, and do not use benzoin. This raises the question of labelling. This 'Tibetan incense' is an example of false labelling. Also, adulterated benzoin should not be sold under the name of 'benzoin'. The consumer should be able to know what he is buying and the origin of the product. Probably very small quantities are sold in each of these shops, but the prices differences are amazing. In constrast, the profits made by the different intermediaries between Sumatra and a European harbour are not very high.

We wonder whether this new trend develop further and if new niche markets can be found for benzoin with an increasing use of natural products such as essential oils, natural flavours and fragrances.

Conclusion

Benzoin production by Batak farmers is based on centuries of indigenous knowledge. Amazingly, benzoin is used for the same purposes (incense, medicine and perfume) all over the world and with an incredible historical continuity. In the same way, present trading channels follow very old trading routes. The uses of benzoin are so much ingrained in cultural and religious habits that we can imagine there will continue to be a demand for it. The Indonesian consumption, which is possibly the highest in the world at the moment, is the most likely to decrease, as using benzoin in rituals is now perceived as backward. If benzoin really is a component of *kretek* cigarettes and if health campaigns occur in the future of the country, this end use could also decrease tremendously. Research is still needed to more accurately define the present marketing channels and the future potential of this product. Benzoin is everywhere, but few people know about it or pay attention to it. Its consumption and trade, which at first sight seemed to belong to the past, are not major enough to be noticed, but are not that minor either.

We recommand that customs offices change their categories, so that import-export figures of 'minor' products such as benzoin can appear separately. For centuries, this product has had no need to be advertised, but it may be time now to advertise it and let consumers know more about it. Its marketing and trade have been operating the same way for centuries. Maybe now, quality standards should be set up. Handling, storing, packaging and transportation of the product could be improved, and maybe also production methods. It would be interesting to label the product properly and make a distinction, as it was already suggested by Dutch chemists in the fourties (Hulssen, 1940), between pure benzoin resin, more appropriate for perfume and chemistry purposes, and adulterated benzoin blocks, cheaper but suitable as

incense. At the moment, benzoin incense consumers have no idea about what the original product looks like, and they have a right to know. As each producing area in North Sumatra has its characteristics, it would be interesting too to classify and label according to the place of production, as it is done for wine, for instance. Local traders know that the most fragrant resin of the area comes from the sub-district of Parlilitan. Perfumers might want to choose this type of product, even with an added value, if its quality standard was kept high and constant.

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