The Medicinal Plant Trade in Suriname

Tinde van Andel, Joelaika Behari-Ramdas, Reinout Havinga and Sara Groenendijk

Research

Abstract

Medicinal plant markets provide not only a snapshot of a country's medicinal flora, but also of the importance of herbal medicine among its inhabitants and their concerns about health and illness. During a market survey in 2006, we collected data on the diversity, source, and volume of plants being sold and exported, and the preferences of urban consumers in Suriname. More than 245 species of medicinal plants were sold at the markets of Paramaribo. The annual value of the domestic and export market was estimated to be worth over US$ 1.5 million. Prices of medicinal products were determined by resource scarcity, processing costs, distance to harvesting sites, and local demand. The growing numbers of urban Maroons with their cultural beliefs regarding health and illness, and their strong family ties to the interior are the moving force behind the commercialization of herbal medicine in Suriname.

Introduction

Medicinal plant markets are fertile grounds for ethnobotanical studies, because they provide a short list of the much wider range of species used in the country. Learning which species are sold, their prices, and the volumes marketed are the first steps in identifying species with resource management priorities. The most frequently recorded medicinal plant species reflect the social importance of their use and link plant utilization to local health issues (Bye & Linares 1983, Cunningham 2001). If a country wants to expand and improve its trade in non-timber forest products (NTFPs), it should investigate the factors affecting the supply and demand. It is also crucial to identify the source areas and the problems and opportunities faced by marketers (Padoch 1992). Unraveling these complex marketing chains should increase market transparency, inform producer groups of market possibilities, and establish more direct links with overseas entrepreneurs (Richards 1993, Williams *et al*. 2000).

International trade in medicinal plant products is generally made visible in national export figures. Rarely, however, these statistics distinguish between the species collected in the wild (NTFPs) and those harvested from agroforestry plots or home gardens. Figures on illegal or informal export hardly exist, and the domestic market is seldom monitored (van Andel *et al*. 2003, Richards 1993). Although medicinal plant markets have drawn the attention of many ethnobotanists (e.g., van der Berg 1984, Bye & Linares 1983, Cunningham 1993, Williams *et al*. 2000), only a few studies present quantitative data on the marketed volume or value (e.g., Padoch 1992, Shanley & Luz 2003). Because of the difficulty in obtaining reliable data from market vendors, middlemen, exporters, and local governments, the trade in medicinal plants still remains a 'hidden harvest' in many countries (Padoch 1992).

Suriname, a former Dutch colony with more than 80% of its surface covered by dense tropical forest, has only 468,613 registered inhabitants (CBB 2006). The popula-

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tion, concentrated around the capital of Paramaribo (pop. 294,000), is mainly Creole, East Indian, Javanese, and Chinese. The country's interior is inhabited by several groups of indigenous peoples: Amerindians (Native Americans) and Maroons, descendants of enslaved Africans who escaped into the forest where they created their own autonomous societies (Price 1996).

The civil war of the 1980s, road improvement, and the lack of employment and educational opportunities in the interior have caused the continuing migration of Amerindians and Maroons to Paramaribo (Kambel & MacKay 1999). Apart from contributing to their health, the harvest and sale of medicinal plants in Suriname seem to provide a significant income for rural and urban individuals. Maroons use many plant species in their **winti** rituals (van Andel & van 't Klooster 2007). The Afro-Surinamese **winti** religion is based on possession by supernatural beings, rituals, and herbal baths. If neglected or not provided with regular offerings, the spirits are believed to cause disease and ill fortune (Stephen 1998, Thoden van Velzen & van Wetering 2004).

The Surinamese government does not consider NTFPs to contribute substantially to the economic development of the country. Until 2004, no requests for permits were submitted for either the commercial or the non-commercial export of medicinal plants. As a result, neither medicinal plants nor NTFPs have been included in Suriname's economic planning or development policies (Behari-Ramdas 2005). The question remains: does the absence of NTFPs in national statistics mean that there is no significant commercial extraction in Suriname or does this activity take place in the undocumented, informal sector?

Only recently has the trade in herbal medicine from Suriname attracted the interest of researchers. A 2000 pilot study on medicinal plant use among Surinamese immigrants in the Netherlands reported the availability of more than 180 species of fresh, dried, and frozen medicinal plants in a small shop run by Saramaccan Maroons in Amsterdam (van Andel & van 't Klooster 2007). The first two studies on Paramaribo markets (van Es 2003, Verwey 2003) focused on social aspects and did not include the collection of plant material. Later, Behari-Ramdas (2005) interviewed 37 market vendors and several shop owners, collected plant material, and discovered 110 different species, 76 of which could be identified to species level. Due to time and budget constraints and the many sterile specimens, she was unable to capture the entire variety of herbs sold.

These reports describe a lively market in Surinamese medicinal plants, but in order to support our hypothesis that this trade is indeed of economic importance, we need to answer several questions. What is the scale of the medicinal plant trade in Suriname? Who are harvesting, buying, and selling traditional medicine? Which herbs and plant uses do Surinamese consumers consider to be most important? This paper presents the results of an extensive market survey, conducted in Suriname in 2006. Our objectives were to describe and quantify the market in herbal medicine and the diversity of the species traded. In this way we could assess its economic importance. This study formed part of the project "*Medicinal plants of Suriname: Changes in plant use after migration to the Netherlands*", still being carried out by the National Herbarium of the Netherlands, in collaboration with the National Herbarium of Suriname.

Methods

From January to July 2006, we regularly visited places of business in Paramaribo that sold herbal medicine, including markets, street vendors, and several shops. We also visited rural markets in Albina, Nickerie, and Moengo and crossed the border into French Guiana to record the herbs that were sold by Surinamese Maroons in Saint Laurent du Maroni (Figure 1). The markets in Paramaribo were visited at least once a week during the 7-month fieldwork period, the Albina market was visited around 10 times and the other markets only once or twice. As this market survey was part of a larger ethnobotanical research project, we could accompany the market vendors to their harvesting sites and collect fertile vouchers for the majority of the medicinal species sold at the markets. Moreover, we questioned several vendors about the amount of plant material they harvested, bought, sold, and discarded per week, as well as the scarcity and popularity of the plants they traded. We set up a Prior Informed Consent contract with the Nature Conservation Division of the Suriname Forest Service (L.B.B.) that was signed by our principal informants.

In the first two months, we worked with several Maroon interpreters. After becoming familiar with most of the commercial species, their uses, and their vernacular names and after learning the local Sranantongo language and the basics of two Maroon dialects, we conducted a systematic quantitative survey of 46 market stalls in April-May 2006. Since we depended on the vendors' willingness to participate, we could not draw a random sample of market stalls. We do not, however, feel that stand size, locality, the type of items sold, or the vendors' ethnicity or ability to speak Dutch had any influence on the seller's trust of foreigners and, as a result, biased our data. We are confident that the participants' stalls and wares sufficiently represented the herbal stands found in the Paramaribo markets at the time of the survey. Similar to Williams *et al*. (2005), we produced a species-accumulation curve to ensure an adequate sampling effort. Per stand, we inventoried all of the plant products sold, the amount of local sales units per species in stock, the size of the stand, the vendor's village of origin, ethnicity and gender. Depending on their stock size, the vendors received be-

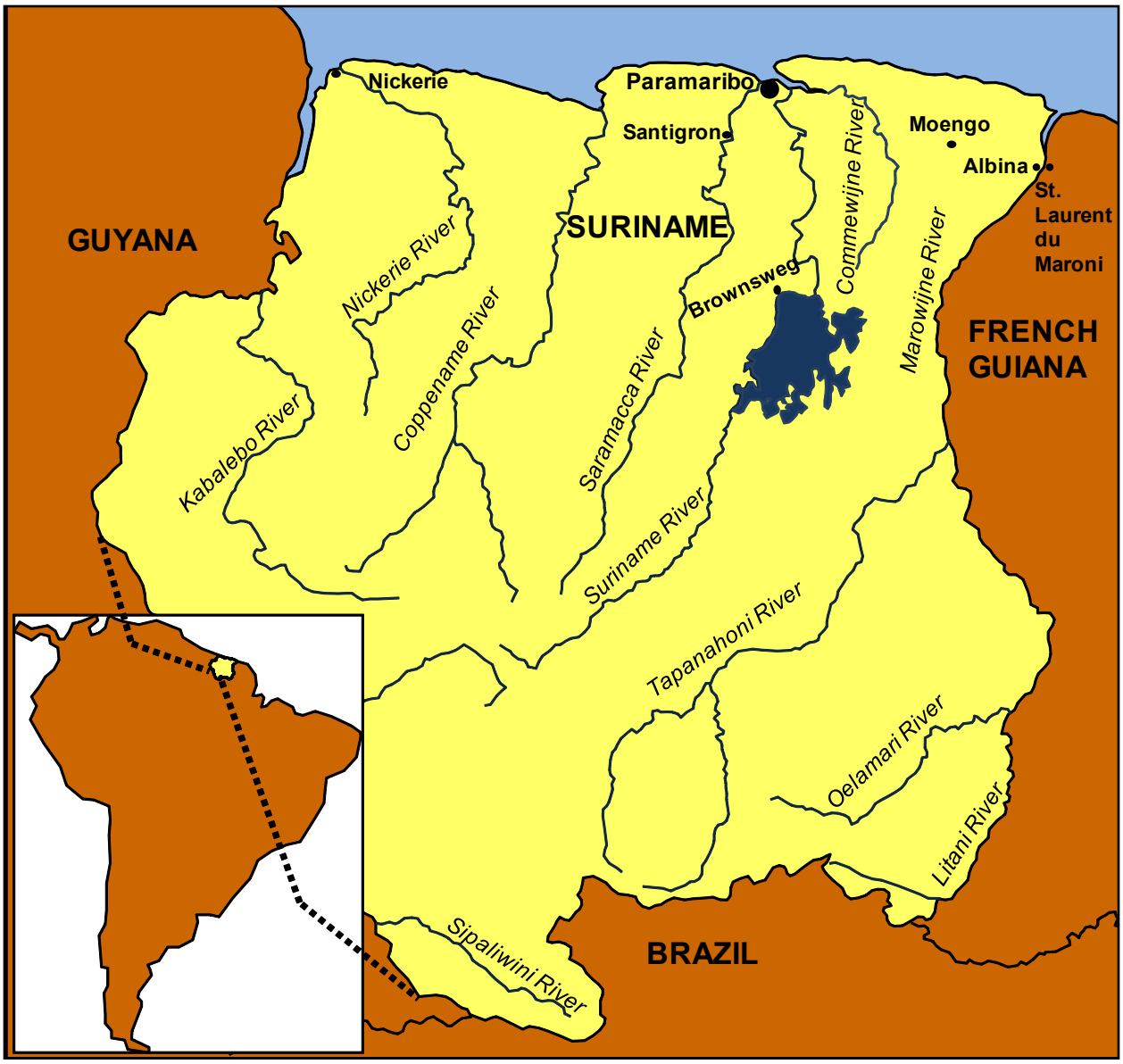

Figure 1. Map of Suriname.

tween $2 and $10 for their contribution. Unknown species were purchased and prepared as herbarium specimens. We recorded the prices and weighed the units in which the material was sold (bundle, bottle, bag, piece of wood/bark/root) for the majority of the species, and estimated the rest. In addition, we measured the total length of occupied herb stalls on both quiet and busy days to estimate marketed volumes. On several occasions, we visited the markets early on Monday mornings when the middlemen and wholesalers arrived with fresh plants from the interior forests. From these data, we could calculate the weight of plant material offered for sale per meter, and subsequently estimate the total annual sales per market.

Finally, we visited three shipping agents for information regarding the amount of herbal medicine exported annually. We also spoke to exporters and customs officers. A complete set of voucher specimens was deposited at both the National Herbarium of Suriname (BBS) and the Utrecht branch of the National Herbarium of the Netherlands (U).

Results and Discussion

Suriname's herbal markets

We inventoried six locations (five markets and a group of street vendors) in Paramaribo where one can purchase medicinal herbs. The registered wooden market tables

had a fixed length of 1 meter and were rented for US$1.50 per week. Although a half a meter could be rented to put down a large basket, quite a few vendors rented several meters. Table 1 lists the average number of stands (i.e., the number of meters) per market selling herbal medicine. The main market selling fresh medicinal herbs was the Vreedzaam Market (Figure 2), located in the city center on the bank of the Suriname River. The number of stands varied from 128 on a quiet rainy weekday to 370 on a busy Saturday or Monday. The much larger Central Market was specialized in food and clothing, but did have approximately 25 stands selling a limited supply of dried herbs and medicinal oil. The South Market '**Markt Zuid**' or '**Noodmarkt**' had ca. 600 stalls selling fruit, vegetables, meat, and herbs. Although there were 200 stalls reserved for herbal medicine, on average only 133 stalls were occupied on a daily basis. The Kwakoe Market was created in February 2006 in order to control the chaos caused by illegal street vendors. All of these sites were permanent daily markets, sometimes open on Sundays.

A few markets in Paramaribo are opened only one or two days a week. The only one we found selling herbal medicine was the Sunday market in the suburb New Ground '**Nieuwe Grond**,' opened on Wednesday and Sunday with 9-18 meters of herb stands. In addition to these markets, we noted several vendors who continued to sell their goods illegally on the streets.

The great majority of the herbal medicine retailers were Maroon women. We recorded less than ten Maroon males behind the 471 herbal medicine stalls we counted during our survey. Other ethnicities were certainly active on the markets, but they rather sold textile, meat, fish, vegetables, clothing, etc.

About 20 shops in Paramaribo sold herbal medicine, but none of them sold fresh plant material. Some of them had a few dried herbs in stock; others were specialized in mixtures for herbal baths and magical **winti** objects, alternative therapies, Hindu religion, Chinese medicine, Indonesian or Brazilian products. The phytomedical industry in Suriname is emerging, and a few drugstores sold ready-made tinctures, oil and cream made from the native flora.

Sabonier Beach, an outskirt of St. Laurent du Maroni (French Guiana), is a popular spot where boats from Albina moor on the Marowijne River beach. More than 30 small stands sold food, soft drinks, beer and bottles of bitter tonic, which was sold for €1 per 'shot'. We counted a total of 97 liters of bitter tonic in stock on a weekday. Ingredients were collected in French Guiana and Suriname, but as the leaves and barks were already soaked in strong sugar cane spirit, they were hard to identify. Therefore, we did not include the results of Sabonier Beach in our calculations. Bundles of fresh herbs were sold at St. Laurent's Ndyuka market, held twice a week on the river

Table 1. Markets sampled in Suriname and French Guiana (2006). (*Although no herb stalls were observed in Nickerie during our survey, Verwey (2003) reported 2 vendors. **Data not included in the analysis.)

Location	Market	Number of stands [m]	Medicinal plant stands [m]	Sample size (# vendors [m])	Number of species found	Mean number of species/m
Paramaribo	Street Stands	50	5	1 [1]	27	27
	Central Market	1000	25	1 [1]	10	5
	Kwakoe Market	200	6	2 [2]	16	8
	Vreedzaam Market	449	250	13 [23]	190	23
	South Market	605	133	13 [35]	92	6
	New Ground	300	13	2 [3]	30	10
Total in Paramaribo		3000	432	32 [65]	190	13.6
Albina	--	32	11	6 [10]	32	± 4
Nickerie	--	500	0-2*	0	-	-
Moengo	--	-	0	0	-	-
St. Laurent	Ndyuka Market	80	8	8 [8]	7	1.5
	Sabonier Beach	30	± 20	2 [2]	**	-
Total in St. Laurent		110	± 28	10 [10]	7	1.5
Total in all locations		3642	471	46 [83]	192	10.5

Figure 2. Medicinal plants offered for sale in Paramaribo, Suriname. Picture by Sara Groenendijk.

bank. Most vendors were Surinamese Ndyukas who fled over the French border during the civil war. They still frequented the Surinamese side of the Marowijne River to tend their agricultural fields, visit family and collect forest products.

Covering the market's floristic diversity

In the period January-July 2006, we encountered a total of 308 medicinal plant products in the Surinamese markets, belonging to about 247 species (see Appendix). Some species yielded various products, such as *Renealmia alpinia* (Rottb.) Maas, whose rhizomes, leaves and fruits were sold separately. We were not able to calculate the exact number of species, since we could not identify all plants to species level, and plants chopped into pieces for bottles of bitter tonics were hard to tell apart. Some products represented several species, such '**babaar udu**' (noisy wood), the magic bark of two tree trunks that lean against each other and make a sinister sound when the wind moves their crowns.

In total, we interviewed 46 vendors, who rented 83 meters of herbal medicine stands. In Paramaribo, we sampled 65 meters, i.e., ca. 15% of the total number of 1-m tables selling herbal medicine. This raised the question: was our sampling sufficient to cover the entire diversity of species offered for sale? Figure 3 shows a species-accumulation curve, with the number of species recorded as a function of the number of tables sampled. We found 95% of the existing species variety after sampling 43 meters of tables, suggesting that our sample size was indeed adequate. Inspection of the 46 market vendors in the months of April and May 2006 yielded 217 plant products, belonging to about 192 species. This represented at most 70% of the existing variety of products and 78% of the total species diversity. Thus, 91 plant products, belonging to 60 species, were encountered in the months preceding and following the survey period. The species-accumulation curve does not level off completely, indicating a set of species that were sold only occasionally, with a small chance of being encountered by researchers.

Most species were sold as bundles of leaves (35%) or entire herbs (31%), or roots (9%). Wood, bark, seeds, oil and other plant parts combined accounted for 25%. Since leaves were the most important commercial product, we expect little difference in seasonal availability of plant products. However, during the heavy floods in May 2006, the harvesters complained that access to their forests was becoming difficult. Contact with their (plant-supplying) family in the interior was almost impossible. People also said that common weeds that grew in house yards (e.g., *Euphorbia thymifolia* L.) were also more difficult to obtain, since large parts of the city were flooded. Our fieldwork covered the small dry season (January-April) and the large wet season (May-July), but we saw little change in prices or plant species being offered for sale during these seven months. Unfortunately, our budget and time schedule did not allow for extension of our fieldwork to one complete year.

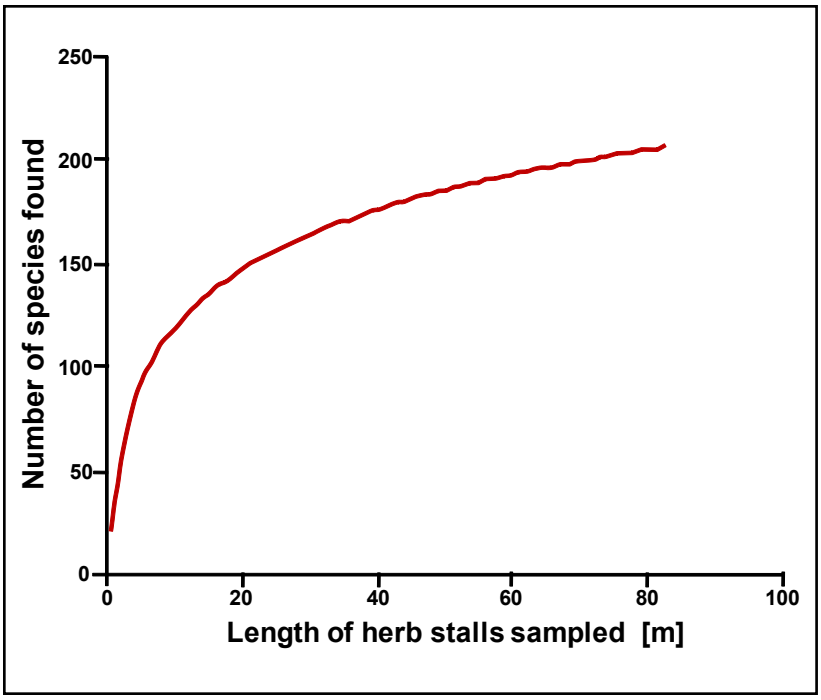

Figure 3. Species-accumulation curve for the 46 market vendors interviewed in April and May 2006 in Suriname.

There might be a seasonal change in demand as certain **winti** spirits are worshipped during particular times of the year, thus requiring the purchase of special herbs in certain months. Market vendors said that public **winti** rituals were more frequent in August, when Surinamers from the Netherlands visited their home country during their holiday. This could lead to increased sales of ingredients for herbal baths, but we have no evidence for this. Likewise, the demand for laxatives and ingredients for ritual cleansing baths might be higher around Christmas, as it is a well-known custom among Surinamers to take an 'old year's bath' and a laxative towards the end of the year. Several people told us that the only occasion they went to the market to buy herbal medicine was towards the end of December. Customers also mentioned an increase in exports just before Christmas.

Most popular species and products

The bulk of the medicinal species were sold either as unpacked whole herbs or as twigs with leaves, folded neatly into a bundle and tied with a polyethylene strip. We noted that as soon as leaves started to wilt and drop from the branches, the bundles were sold at a lower price or simply discarded. The frequency with which the species were offered for sale reflected their demand. Table 2 shows 15 plant products that were encountered most often at the 38 market stalls in Paramaribo and Albina.

Four of the most popular species were non-native, cultivated plants and three were native species domesticated in home gardens for commercial and subsistence use. The remaining eight species were collected in the wild, although all were subject to some form of domestication in Maroon communities. *Begonia glabra* Aubl. and *Renealmia floribunda* K. Schum., both primary forest species that occur in low densities, seemed to suffer from local over-harvesting because of their popularity in **winti** rituals. For more information on the sustainability of medicinal plant collection in Suriname, the reader is referred to the report by Havinga (2006).

Small pieces of *B. glabra* were sold for as much as $5.40, while the average retail price of a bundle of herbs was $1.10. Another quite expensive species was *Psychotria ulviformis* Steyerm., locally known as '**kibri wiwiri**' (hiding herb), with a mean price of $182/kg (Table 3). This creeping herb is difficult to find as its purple-brown leaves are similar in color to the forest floor. It is believed that this plant can make people (or drugs) invisible, the reason for its popularity among cocaine smugglers. The difficulty in locating it, combined with its high demand by individuals who (according to the vendors) earn much money, has resulted in the herb's high prices.

Many of the species listed in Table 3 were only sold (and used) in small quantities. For example, the seeds of many species were sold individually or in small bags and the 'magic' fibers of *Parinari campestris* Aubl. and *Bromelia alta* L.B. Smith were sold in pieces weighing less than 10 g. Bringing large amounts of these items to Paramaribo would easily saturate the market and cause a drop in price.

We did not observe any of the vendors who deliberately combine similar looking species to bulk bundles of plant material for sale to unsuspecting traders or consumers. Once, however, we did see two species of *Phoradendron* tied together in one bundle: these two species can only be distinguished by a trained eye. Just one vendor admitted that he sold leaves of the cultivated '**birambi**' tree (*Phyllanthus acidus* (L.) Skeels) as 'bush **birambi**'. By pretending the leaves came from the interior, he could raise the price. He sold these leaves as a remedy for high blood pressure, but his clients were mostly tourists. Resident market customers appeared much more familiar with the characteristics of the various plants and were not easily cheated. Species of the same genus that are not easily identified when sterile were often sold with the inflorescence attached (e.g., *Heliconia* spp., *Costus* spp., *Psychotria* spp.), so that the customers knew what

Table 2. Most frequently sold medicinal plant products at 38 market stalls in Paramaribo and Albina, Suriname. (Status: cult. = cultivated, dom. = domesticated).

Species	Status	Plant part	Use	% of stalls
Aristolochia cf. *consimilis* Mast.	wild	wood	menstrual pain, bitter tonic	45
Carapa guianensis Aubl.	wild	oil	insect repellent, skin problems	45
Saccharum officinarum L.	cult.	juice	**winti**, mouth sores	43
Cocos nucifera L.	cult.	oil	skin problems, cold	36
Crescentia cujete L.	cult.	fruit	drink medicine, apply bath	34
Scoparia dulcis L.	dom.	entire	diabetes, hepatitis, clean uterus	34
Quassia amara L.	dom.	wood	bitter tonic, menstrual pain	34
Campomanesia aromatica (Aubl.) Griseb.	wild	leaves	vaginal steam bath	31
Phyllanthus amarus Schumach. & Thonn.	wild	entire	menstrual pain, clean uterus	30
Siparuna guianensis Aubl.	wild	leaves	fever, vaginal steam bath	28
Sesamum orientale L.	cult.	seeds	**winti**, ease birth	28
Renealmia floribunda K. Schum.	wild	entire	**winti**	28
Justicia pectoralis Jacq.	dom.	entire	**winti**, cold, kidney problems	21
Begonia glabra Aubl.	wild	entire	**winti**	21
Vismia guianensis (Aubl.) Pers.	wild	leaves	vaginal steam bath	21

Table 3. Most expensive medicinal plant products, Paramaribo, Suriname 2006.

Species	Product	Mean price (US$/kg)
Copaifera guyanensis Desf.	resin	365
Bromelia alta L.B. Smith	fibre	182
Parinari campestris Aubl.	fibre	182
Psychotria ulviformis Steyerm.	whole plant	182
Dipteryx odorata (Aubl.) Willd.	Seeds	154
Aphrodisiac mixture	bark, wood, seeds	137
Astrocaryum sciophilum (Miq.) Pulle	seeds	91
Astrocaryum vulgare Mart.	oil from seeds	91
Trichomanes vittaria DC. ex Poir.	whole plant	91
Mucuna sloanei Fawc. & Rendle	seeds	73
Aframomum melegueta K. Schum.	seeds	73
Ormosia spp.	seeds	61
Xylopia discreta (L.f.) Sprague & Hutch.	seeds	55
Aristolochia cf. *consimilis* Mast.	wood	46
Symphonia globulifera L.f.	resin	46
Phyllanthus acidus (L.) Skeels	leaves	37
Begonia glabra Aubl.	whole plant	34

they were buying. In the Netherlands, however, where many Surinamese are no longer familiar with the forest of their motherland, adulteration of plant material can be observed more often.

Processing also plays an important role in the price of a medicinal product. One example is the acquisition of medicinal oil from *Copaifera guianensis* Desf. This exudate is extracted by drilling a small hole in the tree's trunk and waiting for days until sufficient oil has been secreted – a time-consuming business. Drying and boiling the seeds of *Astrocaryum sciophylum* (Miq.) Pulle in order to extract the oil is a labor-intensive activity. Finally, another way to influence the price is to process several different herbs into a potion. Selling aphrodisiac mixtures is particularly lucrative as the ingredients can be bought cheaply at the market, dried, chopped up, and put in an empty bottle. They are then sold at 10 times the price of the raw material.

Specialization among markets and vendors

At first sight, the multitude of market stalls packed with piles of leaves appeared rather chaotic (see Figure 2). We discovered, however, that the vendors knew exactly what they were selling and how much of each commodity they had in stock. They displayed the bundles on their tables in a well-defined pattern and did not like customers shuffling through their wares. Some of the vendors were specialized in fresh herbs, while others mainly sold bark, wood, and roots. The smaller stalls frequently combined the sale of dried herbs with, for example, coconut oil, white kaolin, and garden produce (e.g., tuberous crops like *Colocasia esculenta* (L.) Schott). Wholesalers occasionally rented a table to sell large amounts of a single species, such as *Phyllanthus amarus* Schumach. & Thonn. or *R. floribunda*, or bags full of Burseraceae resin. Some stands limited their stock to **winti** items like earthenware pots (used for herbal baths), traditional clothing, and magic items (e.g., bird feathers, shells, animal skulls, copper bells). Although most of the female vendors could be described as non-healer specialists, we were told that many **winti** priests did their shopping at the herb markets. The few Maroon herbalists (all males) who had their own stands generally sold the more expensive ready-made aphrodisiacs, laxatives, and uterus medicines.

Most of the plant material sold at the Vreedzaam Market was fresh; the vendors at other markets sold more dried material. Since fresh leaves start to wither after a few days, the bulk of the fresh stock had to be sold within a week. The Vreedzaam Market attracted by far the most customers. The other markets (except for the Central Market) had a much lower turnover of goods and sometimes looked desolate with many empty tables. Not surprisingly, the plant diversity was much higher at the Vreedzaam Market than at the other markets (see Table 1). The highest number of species encountered at one stall was 94, while the average was 27.6 per stall (13.6 spp/m). Although the single street vendor we included in our survey had a relatively high number of species in stock, her stand cannot be considered representative of all street stalls. Vendors

in Albina and French Guiana offered a less diverse selection of merchandise than their Paramaribo colleagues. We did, however, find some herbal medicines there that we had not seen elsewhere. For example, the ashes from the wood of *Luehopsis rugosa* Burret and *Solanum leucocarpon* Dunal and the burned spathes of *Maximiliana maripa* (Aubl.) Drude were snorted as a stimulant. Also, the bottles of bitter tonic offered for sale in Albina and St. Laurent contained many more plant species than those in Paramaribo, indicating differences in local preference and demand.

Most important plant uses

The plant species sold in Paramaribo were used for a variety of purposes, although some were noticeably more important than others. Figure 4 presents a pie chart of how the plants in our survey were used. **Winti** played an important role in the medicinal plant trade. Many species were used to attract good spirits, chase away bad ones, and purify the human body of evil influences. More than half of the commercial species we studied had one or more uses in ancestor rituals, herbal baths, love charms, or protective amulets. Most of these plants also had other (minor) medicinal uses. **Winti** practices were prohibited by law until the 1980s and many Surinamese still regard them as sorcery. Although treated with a great deal of mystery, the results of our market survey proves that the **winti** religion is still very much alive today.

Another factor stimulating the plant trade in Suriname was the frequent use of genital steam baths by the female population. These baths were used as a vaginal tightener and a uterine cleanser after menstruation or childbirth. Women of all ethnicities prepared these baths after child delivery; Maroon women told us they used them every day. More information on this topic will be published elsewhere (van Andel *et al*. 2007). Bitter tonics were also very popular in Suriname. Different species of bitter wood, bark, seeds, and herbs were soaked in alcohol and drunk in small quantities on a daily basis. These bitters were said to improve one's general constitution, work as an aphrodisiac, and protect against malaria, diabetes, and skin sores.

Wholesale, retail and resource areas

Monday was the busiest time at the Vreedzaam Market. The harvesters arrived around 6:00 a.m., with their minivans and trucks loaded with plant bags. We counted between 45 and 57 rice bags (of ca. 10 kilo each) being brought to the market on Monday mornings. Wholesale and bulk-breaking took place on the sidewalk outside the market or on a few tables behind the large hangar. The negotiating and buying started directly after the vans were unloaded. During the seven months fieldwork, we noted two Amerindians among the wholesalers, who were selling bags containing more than 25 kg of Burseraceae resin. Once we saw an Amerindian woman behind a table piled with *R. floribunda*. Several Maroon traders acted simultaneously as producers, wholesalers, and retailers. For example, they harvested plants in the suburbs of town or went by car into the forests just outside Paramaribo during the weekends. Then, on weekdays, they (or their family members) sold the plants at the market. Species that were abundant in the neighborhood were harvested in large quantities and resold to other market vendors. Retailers had about 1-3 bundles per species in stock. The sales ladies told us they had to get up at 4:30 a.m. to take the downtown bus from the suburbs in order to be on time to buy fresh material from the wholesalers. Exporters also bought fresh plants on Mondays since they had to have their goods ready on Tuesday for the evening flight to the Netherlands. During the week, hawkers walked the market paths selling city weeds like *Eclipta prostrata* (L.) L. or *Peperomia pellucida* (L.) Kunth.

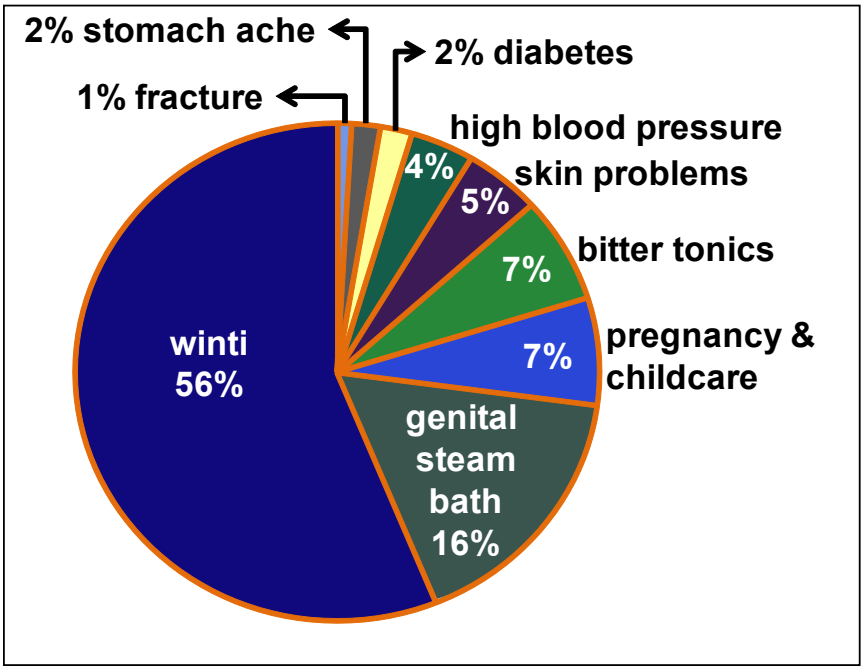

Figure 4. Use percentages of medicinal plants traded in Suriname.

Most of the plants we inventoried were harvested within or just outside Paramaribo: from home gardens, parks, and Paramaribo's numerous overgrown courtyards. The rest was collected in abandoned plantations and along the

dirt roads that enter the country's forested interior. Many harvesters lived in Santigron (see Figure 1), the Maroon village closest to Paramaribo, and from where a daily minibus brought women and plants to market. Since the customers in the capital and those overseas prefer fresh herbs, a plant's perishability affects the distance it can be transported. Women from the upper Marowijne River, for example, only sold peanuts and cassava products from their home towns. They said it was not worth the effort to transport medicinal plants: the plants would spoil during the trip and they could be collected near the capital. A few species that do not grow near Paramaribo were transported over longer distances, including *Melaleuca cajaputi* Powell (from Albina, 150 km away), *B. glabra* (from Brownsweg, ca. 140 km), and an unidentified cinnamon-scented bark (Lauraceae TVA4791) from the Tapanahoni River.

An average bundle of herbs weighed 252 g and, as noted above, costed $1.10. Bargaining is possible and regular customers pay less than tourists or strangers. The average price for herbal medicine (if each product was counted once) was $15 per kg. Cheap products, however, were sold in larger quantities than expensive items. The mean price per kg plant product (as encountered on market stands during our survey) was $8.30. The well-sorted stands (with more than 60 species) reported daily sales of ca. $30. In our sample of 65 meters, we found 882 kg plant material with a value of $8,238. Extrapolated to include the entire Paramaribo market, we estimated that, on an average day, 5900 kg plant material were in stock (worth $48,500). In 2006, all of the Paramaribo markets together sold almost 136,000 kg plant material, with a total estimated value of $1,123,000. Table 4 lists the 15 medicinal products sold in the greatest bulk, summed for all Paramaribo markets, with daily stocks extrapolated from our sample results.

Of all the herbal medicine, molasses was sold in the greatest volume. This sugarcane syrup was used to ease coughs and clean the mouths of babies. Its ceremonial function, however, was much more important. Molasses have a symbolic value for people whose ancestors were forced to work as slaves or were employed as wage laborers on the country's many sugar plantations during the colonial period. Sprinkling a solution of water and molasses from a calabash on the soil or against a tree trunk was thought to pacify the spirits of the sugarcane mills that still haunt the old plantation sites. Molasses was also offered during Hindu ceremonies. *Campomanesia aromatica* (Aubl.) Griseb., *Vismia guianensis* (Aubl.) Pers, *Siparuna guianensis* Aubl., and *Parkia pendula* (Willd.) Benth. ex Walp., for example, were all ingredients of vaginal steam baths. The dried maize cobs were not consumed, but roasted and used in a variety of medicinal mixtures or, in their entirety, in symbolic ancestral meals and other **winti** rituals.

At the end of the day, the remaining stock (which could be worth hundreds of dollars) was packed in bags and stored under the stall tables or locked in small cupboards. Since the lack of adequate storage facilities made theft easy, vendors placed young fronds of the pina palm (*Euterpe oleracea* Mart.), known for their ability to chase away evil, on top of their goods to scare away thieves. We had the impression that the harvesters had a good understanding

Table 4. Medicinal products sold in the greatest bulk, summed for all Paramaribo, Suriname markets.

Product name	Species	Daily market stock (kg)
Molasses (bottles)	*Saccharum officinarum* L.	220.3
Andoya (leaves)	*Campomanesia aromatica* (Aubl.) Griseb.	182.4
Kwasibita (wood)	*Quassia amara* L.	180.4
Sibiwiwiri (whole herb)	*Scoparia dulcis* L.	171.7
Coconut oil	*Cocos nucifera* L.	159.8
Krapa oil	*Carapa guianensis* Aubl.	149.7
Calabash (fruit)	*Crescentia cujete* L.	146.0
Sangrafu (whole plant)	*Costus scaber* Ruiz & Pav.	143.6
Kowru ati (whole plant)	Begonia glabra Aubl.	131.9
Karu (maize cobs)	*Zea mays* L.	128.6
Yarakopi (leaves)	*Siparuna guianensis* Aubl.	117.0
Beh baka pinja pau (leaves)	*Vismia guianensis* (Aubl.) Pers.	98.7
Kwatakama buba (bark)	*Parkia pendula* (Willd.) Benth. ex Walp.	93.2
Fini bita (whole plant)	*Phyllanthus amarus* Schumach. & Thonn.	80.8
Tingi moni (resin)	*Protium heptaphyllum* (Aubl.) Marchand, *Tetragastris panamensis* (Engl.) Kuntze	80.0

of the demand for their species. Many of the plants were collected on request. Apart from the few species that kept their healing properties when dried, most herbs did not have an extensive shelf life. If dried herbs could not be sold for a reduced price, they were thrown away after 2-3 weeks. Based on the weekly discarded amounts reported by several salespersons, we estimated that approximately 373 kg of plant material were discarded annually at the Paramaribo markets.

Ethnicity and social status of herb vendors

Maroon women formed the greater part of the harvesters, traders, and consumers of herbal medicine. Most Saramaccan Maroons sold at the Vreedzaam Market, while the South Market was more popular among the Ndyuka and other tribes. Creoles were also frequent customers – other ethnicities were hardly seen. Most clients (predominantly women between 35-50 years) knew in advance what to buy; others sought advice from the vendors. Most of the tourists who bought plants at the markets were Maroons and Creoles coming to purchase herbs for their family or business in the Netherlands or for **winti** rituals practiced during their holiday in Suriname (Behari-Ramdas 2005).

In spite of the relatively good earnings, most harvesters and sellers of medicinal plants could be classified as poor. They generally lived on the edge of town, along unpaved roads or on squatted ground, without safe drinking water or sanitary facilities. With little time and space available to grow their own food, these women depended on a cash income for their survival. Many of them were illiterate single mothers with many children (van Es 2003). We noticed that few of them spoke Dutch, and some not even Sranantongo, one of the basic requirements for getting a regular job in Suriname. These people migrated from their communities in the interior to the city in order to earn a living, and making use of their traditional plant knowledge was one of the few ways to do so. According to our own interpretations and the research by van Es (2003), the greatest fear these women had was to lose their job as a market vendor due to competition, bad gossip (caused by the 'evil eye' of jealous colleagues), or government regulations concerning taxes or product quality. We think that these factors may explain their suspicion towards outsiders asking questions, taking pictures, or touching their merchandise. After we explained our research objectives in Sranantongo or one of the Maroon languages, however, we quickly gained trust from most of the vendors.

Not all Surinamers interested in herbal medicine visited the market. Some Maroons considered the plants from the coastland to be 'dirty' and preferred to obtain their medicine directly from their families in the interior. In this way, they were sure that the plants were picked in a culturally responsible way, respectful of the forest spirits. Others refused to buy herbs 'collected and sold by menstruating women' and preferred to search for their own plants in the forest. The market vendors, very aware that prejudices with regard to the 'bodily pollution' of their merchandise could cost them their job, ensured us that they stayed home during their menstrual period and left the plant handling to their female siblings.

Because it serves a largely Maroon and Creole clientele, Paramaribo's herbal market is not representative of the entire medicinal plant market in Suriname. The East Indian, Javanese, and Chinese people we spoke to, usually grew medicinal plants in their own gardens, obtained them from family, or bought them in specialized shops. Moreover, many of the medicinal species we observed to be harvested and consumed in the interior were not marketed at all. In fact, we estimate that less than 50% of the medicinal species used in Suriname is commercialized.

Export to the Netherlands

Almost half of the Surinamese population has migrated to the Netherlands since 1972. Even after decades of living in Holland, many still maintain strong social and economic ties with their home country. Although they make use of Dutch health-care facilities, Surinamese immigrants continue to use herbal therapies and keep their cultural concepts of health and illness. There are three ways to export medicinal plants to the Netherlands: send them by air mail, send them by sea container, and take them on the plane to Amsterdam. In 2006, three shipping agents were active in Suriname: the government-owned Suriname Postal Corporation (Surpost) and the private companies Jos Steeman and Central Freight Services. None of them kept official figures on the amount of herbal medicine that was exported. Export forms only contained the categories food, clothing, household equipment, and 'other'; many customers mailed a combination. Still, the managers of the three shipping agents were able to supply us with weekly estimates of plant cargo (Table 5). We extrapolated these estimates to annual amounts, reaching a total of 54,600 kg per year with a value of $453,180, using the average price of $8.30 per kg.

Table 5. Estimated value of exported medicinal plants sent by air mail from Suriname.

Company	Estimated weekly exports (kg)	Extrapolated annual exports (kg)
Suriname Postal Corporation	150	7,800
Jos Steeman Shipping NV	200	10,400
Central Freight Services Suriname	700	36,400
Total export	1,050	54,600

Due to the perishability of the plant products, the bulk of the material was sent by airmail. The plants were quickly scanned by the customs officers, after which they were crammed into cardboard boxes. Few medicinal products were sent by sea container as they might take several months to arrive. Parcels weighing more than 10 kg required a permit from the Ministry of Commerce and Industry; however, this was just a formality and no detailed information about the items had to be given. Apparently, customs officers did not demand an official permit for the export of medicinal plants. In 2006, air mail parcels were shipped for $3-5 per kg. The great majority of these herbs were sent to friends, families, and shops in the Netherlands. Exporters either collected the plants directly in the wild or bought them at the markets. Herbal medicine was also sold in the departure lounge of the Suriname airport and many passengers carried plants with them. No information, however, exists with regard to the amount of plant material taken in hand luggage to the Netherlands.

Conclusion

Non-timber forest products (NTFPs) often bypass formal channels of commerce (Shanley *et al*. 2002). The trade in medicinal plants in Suriname is no exception, although many of the species are cultivated and therefore cannot be classified as NTFPs. Even though the market stalls are numbered and rented, export forms are requested, and some vendors wear registration tags, the herbal medicine market in Suriname still has an informal character. Just like in other developing countries, the Surinamese people involved in this business are self-employed, unrecognized in official statistics, have little access to capital, and earn money from labor-intensive enterprises (Cunningham 2001). One must keep in mind, however, that the lack of official figures on these activities does not imply a limited contribution to the country's economy. We estimate that the trade in herbal medicine in Suriname offers employment to several hundred households. If we add the estimated annual value of the domestic market to that of the export market, we end up with a medicinal plant trade worth $1,576,180 per year. This figure is higher than the registered wildlife export revenues (Duplaix 2001) and approaches the export earnings of the country's timber industry that vary between $2.3 and 4.2 million (Dagblad Suriname 2005, Tropenbos 2004). We therefore believe that medicinal plants and NTFPs need to be incorporated in Suriname's national development policies.

Although official documents on the scale of the medicinal plant trade are lacking, we have reason to believe that it is expanding. While van Es (2003) did not report much economic activity in 2002, we encountered vendors who sold $130 worth of goods on a peak day. The number of market vendors (n=83) in 2002 had increased to several hundreds by 2006. There may be several reasons for the expanding trade in herbal medicine in and from Suriname. The most important factor seems to be the urbanization of Maroons, but the growing Surinamese economy (www.imf.org), the emerging phytomedical industry, and the improved socioeconomic position of Surinamese migrants in Dutch society also contribute to this phenomenon (van Niekerk 2000). More research is needed to quantify such trends, but the expansion of the mobile phone network in Suriname has definitely contributed to a better adjustment of supply and demand.

Spiritual well-being by means of **winti** rituals and a clean body obtained by genital washing, herbal baths, laxatives, and blood-purifying bitter tonics are considered essential, in particular by the Afro-Surinamese population. We prefer to define these preparations as health promoters, rather than as cures for physical diseases, and we think that few prescription medicines could serve as a substitute. As long as the cultural importance of a clean body and soul persists, the associated medicinal plants will be necessary, even if access to modern health care (either in Suriname or in the Netherlands) is improved.

Our market survey demonstrates that both the domestic and the export trade in medicinal plants in Suriname are of considerable economic importance. Maroons are the main harvesters, sellers, consumers and exporters of herbal medicine. Both the diversity and the abundance of marketed species reflect their cultural beliefs regarding health and illness. The ongoing urbanization of Maroons will probably increase the marketing of medicinal plants in the near future.

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Appendix: Medicinal species sold on the Suriname markets in 2006

Only the most common medicinal uses and vernacular names of each species are mentioned.

Languages: Sr = Sranan tongo, Au = Ndyuka, Sa = Saramaccan, Jav = Javanese
Part sold: a = ashes, ar = aerial root, b = bulb, ba = bark, f = fiber, fl = flowers, fr = fruits, j = juice, lvs = leaves, r = root, re = resin, s = seeds, sp = spine, st = stem, wh =whole plant, wo = wood.

Family	Scientific name	Vernacular name (language)	Medicinal use	Part sold
Acanthaceae	*Justicia calycina* (Nees) V.A.W.Graham	**daanda** (Sa)	anemia	wh
	Justicia pectoralis Jacq.	**pawinti wiwiri** (Sr)	**winti**	wh
	Justicia secunda Vahl	**brudu uwii** (Sr)	anemia	wh
Adiantaceae	*Adiantum leprieurii* Hook.	**blaka futu** (Sr)	**winti**	wh
	Adiantum serrato-dentatum Willd.	**blaka-futu** (Sr)	**winti**	wh
	Pityrogramma calomelanos (L.) Link	**weti baka** (Sr)	**winti**	wh
Agavaceae	*Furcraea foetida* (L.) Haw.	**ingi sopo** (Sr)	uterus problems, **winti**, hepatitis, stomach ache	lvs
Amaranthaceae	*Cyathula prostrata* (L.) Blume	**temeku** (Sa)	**winti**	wh
Amaryllidaceae	*Hippeastrum* sp. (van Andel 5158 U)	**gado law** (Sr)	**winti**	b
Anacardiaceae	*Anacardium occidentale* L.	**kasju** (Sr)	diarrhea, **winti**	ba, lvs
	Spondias mombin L.	**mope** (Sr)	genital bath, wounds, kidney problems	ba, lvs
Annonaceae	*Annona muricata* L.	**zuurzak** (Sr)	stress	lvs
	Xylopia discreta (L.f.) Sprague & Hutch.	**pegreku** (Sr)	genital bath	fr, lvs
Apiaceae	*Eryngium foetidum* L.	**uman kwintu** (Au)	**winti**	wh
	Hydrocotyle umbellata L.	**pankuku wiwiri** (Sr)	**winti**	wh
Apocynaceae	*Tabernaemontana siphilitica* (L.f.) Leeuwenb.	**kapuwa uwii** (Sa)	infection	lvs
	Tabernaemontana undulata Vahl	**ketenge posu** (Sa)	skin sores	lvs
Araceae	*Heteropsis flexuosa* (Kunth) G.S.Bunting	**kamina** (Sr)	**winti**	ar
	Philodendron cf. *melinonii* Brongn. ex Regel	**diatatai (**Sr**)**	**winti**	ar
	Philodendron scandens K. Koch & Sello	**abrasa** (Sr)	**winti**, baby care	wh
	Philodendron solimoesense A.C. Sm.	**maka tetey** (Sr)	**winti**	ar
Araliaceae	*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin	**tobitutu** (Sa)	cold, **winti**	lvs
Arecaceae	*Astrocaryum sciophilum* (Miq.) Pulle	**bugru maka** (Sr)	**winti**	s
	Astrocaryum vulgare Mart.	**tjo tjo, awarra** (Sr)	fractures, pregnancy	oil, r
	Cocos nucifera L.	**kronto oli** (Sr)	skin problems	oil
	Euterpe oleracea Mart.	**pina** (Sr)	pregnancy	r, lvs, fl
	Mauritia flexuosa L.f.	**moensi lutu** (Sa)	pregnancy	r

Family	Scientific name	Vernacular name (language)	Medicinal use	Part sold
Arecaceae	*Maximiliana maripa* (Aubl.) Drude	**maripa** (Sr)	**winti**, pregnancy, stimulant	a, oil, r, lvs, fl
	Oenocarpus bacaba Mart.	**kumbu** (Sr)	pregnancy	r, lvs
Aristolochiaceae	*Aristolochia* cf. *consimilis* Mast.	**loango tetei** (Sr)	bitter tonic	wo
Asphodelaceae	*Aloe vera* (L.) Burm. f.	**semprefisi** (Sr)	laxative, wounds, **winti**, bronchitis	wh
Aspleniaceae	*Asplenium serratum* L.	**apuku kamsa** (Au)	**winti**	wh
Asteraceae	*Bidens cynapiifolia* Kunth	**kinama nam** (Sa)	**winti**	wh
	Calea caleoides (DC.) H. Rob.	**wolo tapiki a gaide dendu** (Sa)	genital bath	wh
	Chromolaena odorata (L.) R.M. King & H. Rob.	**pikin nenge lanser** (Sr)	skin problems, **winti**	wh
	Clibadium surinamense L.	**kunami** (Sr)	**winti**, cold, genital bath	lvs
	Eclipta prostrata (L.) L.	**luisa wiwiri** (Sr)	fractures	wh
	Elephantopus mollis Kunth	**man kwintu** (Au)	muscle ache, obstipation	wh
	Eupatorium triplinerve Vahl	**sekrepatu wiwiri** (Sr)	hypertension, cold, diarrhea	wh
	Mikania micrantha Kunth	**brokobaka** (Sr)	skin problems, **winti**, pain	wh
	Rolandra fruticosa (L.) Kuntze	**brokopanji** (Sr)	baby care, **winti**	wh
	Struchium sparganophorum (L.) Kuntze	**seigotro** (Sa)	**winti**	wh
	Tilesia baccata (L.) Pruski	**sukrutanta** (Sr)	diabetes	lvs
	Unxia camphorata L.f.	**kamferbita** (Sr)	bitter tonic	wh
Begoniaceae	*Begonia glabra* Aubl.	**kowroe ati** (Sr)	**winti**	wh
Bignoniaceae	*Arrabidaea bilabiata* (Sprague) Sandwith	**duludulu** (Sr)	health promotion	wo
	Crescentia cujete L.	**krabasi** (Sr)	**winti**	fr, lvs
	Macfadyena unguis-cati (L.) A.H. Gentry	**awawe ansa** (Sa)	genital bath	wh
	Mansoa alliacea (Lam.) A.H. Gentry	**ajoen tete** (Au)	**winti**, slimming agent	lvs, wo
	Tanaecium nocturnum (Barb. Rodr.) Bureau & K.Schum.	**wata wanu** (Sa)	**winti**	wh
Bixaceae	*Bixa orellana* L.	**kuswe** (Sr)	**winti**	fr
Boraginaceae	*Cordia schomburgkii* DC.	**kow uwii** (Au)	genital bath	lvs
	Cordia tetrandra Aubl.	**tafrabon** (Sr)	genital bath	lvs
	Heliotropium indicum L.	**kakafokankan** (Au)	**winti**	wh
	Tournefortia ulei Vaupel	**alamankina** (Sa)	allergy	wh
Bromeliaceae	*Ananas comosus* (L.) Merr.	**ananas** (Sr)	abortion	fr
	Bromelia alta L.B. Sm.	**singrassie** (Sr)	pregnancy	f
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	**tingi moni** (Sr)	genital bath, **winti**	lvs, re
	Tetragastris panamensis (Engl.) Kuntze	**busi nenge kandra** (Sr)	**winti**	re

Family	Scientific name	Vernacular name (language)	Medicinal use	Part sold
Burseraceae	*Trattinnickia* cf. *lawrancei* Standl.	**aluwau** (Sa)	tooth ache	lvs
Cecropiaceae	*Cecropia peltata* L.	**uma busi papaya** (Sr)	kidney problems	lvs
	Cecropia sciadophylla Mart.	**man busi papaya** (Sr)	kidney problems	lvs
	Coussapoa angustifolia Aubl.	**gaan tete** (Sa)	**winti**	ar
Chrysobalanaceae	*Hirtella paniculata* Sw.	**san yu wan' mi bai g'yu** (Sr)	genital bath	lvs
	Licania membranacea Sagot ex Laness.	**matu baaso** (Sa)	**winti**	lvs
	Parinari campestris Aubl.	**fungu** (Sr)	**winti**	lvs, f
Clusiaceae	*Clusia grandiflora* Splitg.	**abrasa** (Sr)	**winti**	ar
	Symphonia globulifera L.f.	**matakki** (Sr)	**winti**	re
Combretaceae	*Terminalia amazonia* (J.F. Gmel.) Exell	**anango switi** (Sa)	genital bath	lvs
Commelinaceae	*Commelina diffusa* Burm.f.	**weti gadodede** (Sr)	**winti**	wh
	Tripogandra serrulata (Vahl) Handlos	**redi gadodede** (Sr)	**winti**	wh
Convolvulaceae	*Cuscuta americana* L.	**duivelsnaaigaren** (Sr)	kidney problems, sores	wh
	Ipomoea batatas (L.) Lam.	**swit-patatawiwiri** (Sr)	**winti**	wh
Costaceae	*Costus arabicus* L.	**weti singaafu** (Au)	**winti**	lvs
	Costus scaber Ruiz & Pav.	**lebi singaafu** (Au)	**winti**	lvs, r
Crassulaceae	*Bryophyllum pinnatum* (Lam.) Kurz	**wonderblad** (Sr)	asthma	lvs
Cucurbitaceae	*Lagenaria siceraria* (Molina) Standl.	**godo** (Au)	**winti**	fr
	Momordica charantia L.	**busi sopropo** (Sr)	diabetes	wh
Cyperaceae	*Cyperus prolixus* Kunth	**adru** (Sr)	**winti**, baby care	r
	Scleria secans (L.) Urb.	**kingesi** (Sa)	**winti**, menstruation	wh
	Scleria stipularis Nees	**babun nefi** (Sa)	**winti**	wh
Dilleniaceae	*Davilla kunthii* A. St.-Hil.	**schuurpapier** (Sr)	genital bath	wh
	Davilla nitida (Vahl) Kubitzki	**faya tatai** (Au)	genital bath	wh
Euphorbiaceae	*Croton trinitatis* Millsp.	**pikin nenge leleti** (Sa)	kidney problems, baby care	wh
	Euphorbia thymifolia L.	**tjembe uwii** (Au)	**winti**, diarrhea	wh
	Jatropha curcas L.	**kakanoto** (Sr)	wounds, laxative	fr, lvs
	Jatropha gossypiifolia L.	**rode schijtnoten** (Sr)	laxative	fr
	Manihot esculenta Crantz	**kasaba** (Sr)	sores	lvs, r
	Maprounea guianensis Aubl.	**kisangula** (Sa)	genital bath, tooth ache	lvs
	Ricinus communis L.	**krapata** (Sr)	laxative, swelling, **winti**, ease birth	lvs, oil

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Fabaceae	*Adenanthera pavonina* L.	**kokriki** (Sr)	**winti**	s
	Arachis hypogaea L.	**kondre pinda** (Sr)	**winti**	wh
	Bauhinia guianensis Aubl.	**kolada** (Au)	**winti**	wo
	Bauhinia surinamensis Amshoff	**kolada** (Au)	**winti**	wo
	Copaifera guyanensis Desf.	**opro oli buba** (Au)	diabetes, hypertension, skin problems	ba, re
	Crotalaria micans Link	**apuku baasi** (Au)	**winti**	wh
	Desmodium adscendens (Sw.) DC.	**mapinda pinda** (Sa)	**winti**	wh
	Desmodium triflorum (L.) DC.	**mapinda pinda** (Sa)	**winti**	wh
	Dipteryx odorata (Aubl.) Willd.	**tonka siri** (Sr)	hair improvement	s
	Hymenaea courbaril L.	**loksi** (Sr)	hypertension, diarrhea, pregnancy	re, ba
	Inga alba (Sw.) Willd.	**prokonie buba** (Sr)	wounds, sores, **winti**	ba
	Inga heterophylla Willd.	**apuku waki** (Sa)	**winti**	lvs
	Inga virgultosa (Vahl) Desv.	**apuku wiwiri** (Sr)	**winti**	lvs
	Inga sp.	**pepre, peka** (Au)	genital bath	lvs
	Lonchocarpus chrysophyllus Kleinh.	**man-neku** (Sr)	**winti**, asthma, rheumatism	wo, r
	Lonchocarpus heptaphyllus (Poir.) DC.	**neku tetey** (Sr)	**winti**, asthma, rheumatism	wo, r
	Lonchocarpus negrensis Benth.	**pikin neku** (Sr)	**winti**, asthma, rheumatism	lvs
	Lonchocarpus sp. (Behari 25 BBS)	**vrouw-neku** (Sr)	**winti**, asthma, rheumatism	lvs, wo
	Mimosa myriadenia (Benth.) Benth.	**wacht-een-beetje** (Sr)	menstruation, baby care	r
	Mimosa pudica L.	**seemai** (Sa)	genital bath	wh
	Mucuna sloanei Fawc. & Rendle	**kaw ai** (Sr)	**winti**	s
	Ormosia sp. (van Andel 5295B U)	**agi sii** (Au)	**winti**	s
	Bocoa sp. (van Andel 5492 U)	**hogi pau** (Sa)	**winti**	wo
	Parkia pendula (Willd.) Benth. ex Walp.	**kwatakama** (Sr)	**winti**, genital bath	lvs, ba
	Parkia ulei (Harms) Kuhlm. var. *surinamensis* Kleinh.	**bigi-udu** (Sr)	**winti**, genital bath	ba
	Pseudopiptadenia suaveolens (Miq.) J.W. Grimes	**pikinmisiki** (Sa)	**winti**, baby care	ba
	Senna occidentalis (L.) Link	**alibi alibi** (Sa)	stomach ache, **winti**	r, lvs
	Senna quinquangulata (Rich.) H.S. Irwin & Barneby	**gaan pesi** (Au)	infertility, baby care	lvs
	Tephrosia sinapou (Buc'hoz) A. Chev.	**wanapu** (Sa)	**winti**	lvs

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Gentianaceae	*Coutoubea ramosa* Aubl.	**lokosi bita** (Sa)	bitter tonic	wh
Gleicheniaceae	*Dicranopteris pectinata* (Willd.) Underw.	**man amoman** (Sa)	**winti**	wh
Heliconiaceae	*Heliconia bihai* (L.) L.	**bigi apuku palulu** (Sr)	**winti**	lvs +fl
	Heliconia richardiana Miq.	**pikin apuku palulu** (Sr)	**winti**	lvs +fl
Hymenophyllaceae	*Trichomanes vittaria* DC. ex Poir.	**dyaba té** (Au)	**winti**	wh
Hypericaceae	*Vismia cayennensis* (Jacq.) Pers.	**weti baka pinya pau** (Sa)	genital bath	lvs
	Vismia guianensis (Aubl.) Choisy	**redi baka pinya pau** (Sa)	genital bath	lvs
	Vismia japurensis Reichardt	**gaan pinya pau** (Sa)	genital bath	lvs
	Vismia macrophylla Kunth	**gaan pinya pau** (Sa)	genital bath	lvs
Lamiaceae	*Hyptis atrorubens* Poit.	**fuku fuku menti** (Sa)	cold, diabetes, **winti**	wh
	Hyptis lanceolata Poir.	**fayadyan** (Sa)	itch, wounds, cold, **winti**	wh
	Hyptis mutabilis (Rich.) Briq.	**gado pai pina** (Sr)	**winti**	wh
	Ocimum campechianum Mill.	**smeriwiwiri** (Sr)	**winti**, wounds, skin parasites	wh
	Ocimum tenuiflorum L.	**tulsie** (Sr)	cold, fever, Hindu rituals	wh
	Orthosiphon aristatus (Blume) Miq.	**kumis kucing** (Jav)	kidney stones	lvs
Lauraceae	*Ocotea guianensis* Aubl	**apisi** (Au)	hair improvement	lvs
	Lauraceae sp. (van Andel 4791 U)	**kaneri buba** (Sr)	baby care	ba
Lecythidaceae	*Couratari guianensis* Aubl.	**ingi pipa** (Sr)	**winti**	fr
Loganiaceae	*Spigelia anthelmia* L.	**drunguman** (Sr)	worms	wh
	Spigelia hamelioides Kunth	**busi drunguman** (Sr)	**winti**	wh
	Strychnos melinoniana Baill.	**dobrodua** (Sr)	aphrodisiac	wo
	Strychnos sp. (van Andel 4788 U)	**dobrodua pepre wan** (Sr)	aphrodisiac	wo
Loranthaceae	*Phthirusa pyrifolia* (Kunth) Eichler	**pikin fowru-doti** (Sr)	baby care	wh
	Phthirusa stelis (L.) Kuijt	**pikin fowru doti** (Sr)	cancer, **winti**, genital bath	wh
	Struthanthus syringifolius (Mart.) Mart.	**pikin fowru-doti** (Sr)	baby care	wh
Lycopodiaceae	*Lycopodiella cernua* (L.) Pic. Serm.	**pratilobi** (Sr)	**winti**	wh

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Malpighiaceae	*Byrsonima spicata* (Cav.) DC.	**afspraak** (Sr)	genital bath	lvs
	Hiraea faginea (Sw.) Nied.	**alata pau** (Sa)	genital bath	wh
	Stigmaphyllon sinuatum (DC.) A. Juss.	**kon-koni kasaba** (Sr)	skin parasites	lvs, r
Malvaceae	*Abelmoschus moschatus* Medik.	**yorka oker** (Sr)	**winti**	fr, wh
	Gossypium barbadense L. (2 varieties)	**redi/weti katun** (Sr)	**winti**, hypertension, menstruation	lvs
	Lueheopsis rugosa (Pulle) Burret	**djaba udu asisi** (Au)	**winti**	a
	Quararibea guianensis Aubl.	**kii kii** (Au)	**winti**	wo
	Waltheria indica L.	**dusu sma** (Sa)	**winti**	wh
Marantaceae	*Ischnosiphon arouma* (Aubl.) Körn.	**warimbo** (Sr)	**winti**	lvs
	Ischnosiphon gracilis (Rudge) Körn.	**pikin babaduwa** (Sa)	**winti**	lvs
	Ischnosiphon puberulus Loes.	**gaan babadua** (Sa)	**winti**	lvs
	Maranta arundinacea L. (2 varieties)	**ingi taja** (Sr)	**winti**	r
Mayacaceae	*Mayaca* sp. (van Andel 5444 U)	**wata amoman** (Sa)	**winti**	wh
Melastomataceae	*Aciotis purpurascens* (Aubl.) Triana (2 varieties)	**weti/lebi swa uwii** (Au)	urinary tract, **winti**	lvs
	Bellucia grossularioides (L.) Triana	**brokopipi** (Au)	genital bath	lvs
	Clidemia capitellata (Bonpl.) D. Don	**uma baddoek** (Sr)	genital bath	lvs
	Clidemia hirta (L.) D. Don	**sopo uwii** (Sa)	genital bath	lvs
	Miconia lateriflora Cogn.	**bigi busi smei uwii** (Sa)	**winti**	lvs
	Miconia lepidota DC.	**lena opo mi tapu** (Sa)	genital bath	lvs
	Miconia prasina (Sw.) DC.	**a suku trobi** (Sr)	genital bath	lvs
	Miconia racemosa (Aubl.) DC.	**adjompo pasi** (Sr)	genital bath	lvs
	Miconia tomentosa (Rich.) D. Don ex DC.	**musu dey brasa** (Sr)	genital bath	lvs
	Nepsera aquatica Naudin	**ingiwiwiri** (Sr)	baby care	wh
	Tibouchina aspera Aubl.	**bon-bon gaasa** (Sa)	genital bath	lvs
Meliaceae	*Azadirachta indica* A. Juss.	**neem** (Sr)	skin problems	lvs
	Carapa guianensis Aubl.	**krapa** (Sr)	skin problems, diabetes	oil, ba
	Guarea gomma Pulle	**kodjo uwii** (Sa)	hepatitis, vomiting agent	lvs
Menispermaceae	*Abuta* sp. (van Andel 5488 U)	**goni lopu** (Sa)	**winti**	wo
Moraceae	*Brosimum rubescens* Taub.	**pajaa udu** (Au)	**winti**	wo
	Ficus nymphaeifolia Mill.	**liba tapu katu** (Sa)	**winti**	leaf
	Ficus schumacheri (Liebm.) Griseb.	**fini uwii katu** (Sa)	fractures	lvs

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Musaceae	*Musa* sp.	**bacove** (Sr)	venereal diseases, **winti**, pregnancy	fr, lvs, fl
Myristicaceae	Virola surinamensis (Rol. ex Rottb.) Warb.	**babun udu** (Sr)	female sterility	fr
Myrtaceae	*Campomanesia aromatica* (Aubl.) Griseb.	**andoya** (Sa)	genital bath	lvs
	Eugenia patrisii Vahl	**logoso futu** (Au)	general sickness	lvs
	Melaleuca cajuputi Powell	**Albina uma** (Sr)	genital bath	lvs
	Myrciaria floribunda (H. West ex Willd.) O. Berg	**apiki abonbon** (Sa)	genital bath	lvs
Nymphaeaceae	*Nymphaea amazonum* Mart. & Zucc.	**pankuku wiwiri** (Sr)	**winti**, skin sores	lvs
Onagraceae	*Ludwigia nervosa* (Poir.) H. Hara	**paranamklem** (Sr)	genital bath	wh
Passifloraceae	*Passiflora glandulosa* Cav.	**markusa** (Sr)	**winti**	lvs
Pedaliaceae	*Sesamum orientale* L.	**abongra** (Sr)	**winti**	s, lvs
Phyllanthaceae	*Phyllanthus acidus* (L.) Skeels	(**busi**) **birambi** (Sr)	hypertension	lvs
	Phyllanthus amarus Schumach. & Thonn.	**fini bita** (Sr)	bitter tonic	wh
Phytolaccaceae	*Microtea debilis* Sw.	**eiwit wiri** (Sr)	urinary tract problems	wh
	Petiveria alliacea L.	**bakru wiwiri** (Sr)	**winti**	wh
Pinaceae	*Pinus caribaea* Morelet	**pispen** (Sr)	**winti**	wo
Piperaceae	*Peperomia pellucida* (L.) Kunth	**konsaka wiwiri** (Sr)	sore eye	wh
	Peperomia rotundifolia (L.) Kunth	**tiensensi wiwiri** (Sr)	**winti**, stomach ache	wh
	Piper aduncum L.	**gaaman udu anu** (Au)	**winti**	lvs
	Piper arboreum Aubl.	**kulakatinga** (Sa)	**winti**	lvs
	Piper brownsbergense Yunck.	**blaka kulakatinga** (Sa)	**winti**	lvs
	Piper marginatum Jacq.	**malembelembe** (Sa)	**winti**	r, lvs
	Piper pulleanum Yunck.	**kulakatinga** (Sa)	**winti**	lvs
Poaceae	*Eleusine indica* (L.) Gaertn.	**mangrassi** (Sr)	**winti**	wh
	Imperata brasiliensis Trin.	**mosonjo** (Sa)	**winti**	wh
	Oryza glaberrima Steud.	**blaka alesi** (Sr)	**winti**	s
	Oryza sativa L.	**padi** (Sr)	**winti**, bedwetting	s, wh
	Paspalum conjugatum P.J. Bergius.	**longaasie** (Au)	**winti**	wh
	Saccharum officinarum L.	**melasse** (Sr)	**winti**, cough, baby care	j, lvs, st
	Zea mays L.	**karu** (Sa)	**winti**, aphrodisiac	s
Portulacaceae	*Portulaca oleracea* L.	**posren** (Sr)	skin	wh

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Rubiaceae	*Borreria verticillata* (L.) G. Mey.	**oselin** (Sa)	baby care	wh
	Coccocypselum guianense (Aubl.) K. Schum.	**fodoe kama** (Sa)	**winti**	wh
	Coffea liberica W. Bull. ex Hiern	**kofi uwii** (Sa)	**winti**	lvs
	Morinda citrifolia L.	**noni** (Sr)	health promotion	fr
Rubiaceae	*Palicourea guianensis* Aubl.	**aiaato asisi** (Au)	stimulant	a
	Psychotria bracteocardia (DC.) Müll. Arg.	**man apukuroos** (Sr)	**winti**	lvs+fl
	Psychotria capitata Ruiz & Pav.	**akantasi uwii** (Sa)	**winti**	wh
	Psychotria poeppigiana Müll. Arg.	**uma apukuroos** (Sr)	**winti**	lvs+fl
	Psychotria ulviformis Steyerm.	**kibri wiwiri** (Sr)	**winti**	wh
	Uncaria guianensis (Aubl.) J.F. Gmel.	**popokainangra** (Sr)	genital bath	lvs
Rutaceae	*Citrus aurantifolia* (Christm.) Swingle	**lemmetje** (Sr)	**winti**	lvs, r, fr
	Citrus aurantium L.	**swa alanya** (Sa)	genital bath	fr
	Ertela trifolia (L.) Kuntze	**kofimisa** (Sa)	bitter tonic	wh
	Zanthoxylum pentandrum (Aubl.) R.A. Howard	**he** (Sa)	**winti**	r, lvs
Salicaceae	*Banara guianensis* Aubl.	**akubagon** (Sa)	skin	lvs
	Casearia arborea (Rich.) Urb.	**kape pau** (Sa)	stimulant	a
	Xylosma tessmannii Sleumer	**yorka maka** (Sr)	**winti**	sp, r, lvs
Sapindaceae	*Paullinia pinnata* L.	**feifi finga wiwiri** (Sr)	diabetes	lvs
	Vouarana guianensis Aubl.	**singabaasi** (Sa)	baby care	lvs
Scrophulariaceae	*Scoparia dulcis* L.	**sibiwiwiri** (Sr)	hepatitis	wh
Selaginellaceae	*Selaginella radiata* (Aubl.) Spring	**oko kowa** (Sa)	**winti**	wh
Simaroubaceae	*Quassia amara* L.	**kwasibita** (Sr)	bitter tonic	lvs, wo
Siparunaceae	*Siparuna guianensis* Aubl.	**yarakopi** (Sr)	genital bath	lvs
Smilacaceae	*Smilax* cf. *schomburgkiana* Kunth	**agbago maka** (Sa)	aphrodisiac	r
Solanaceae	*Capsicum frutescens* L.	**alataka pepre** (Au)	**winti**	wh
	Cestrum latifolium Lam.	**parabita** (Sr)	genital bath	lvs
	Nicotiana tabacum L.	**tabaka** (Au)	**winti**	lvs
	Physalis angulata L.	**batotobita** (Sr)	bitter tonic	wh
	Solanum americanum Mill.	**agoma uwii** (Sa)	bitter tonic	wh
	Solanum leucocarpon Dunal	**abo pau** (Sa)	genital bath, stimulant	lvs, a
	Solanum stramoniifolium Jacq.	**gaan maka** (Sr)	pregnancy problems	wh

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Verbenaceae	*Lantana camara* L.	**makamaka** (Sa)	stomach ache, fever, **winti**	r, lvs
	Lippia alba (Mill.) N.E. Br.	**pije pije pau** (Sa)	fever, cold	wh
	Stachytarpheta cayennensis (Rich.) Vahl	**alata labu** (Sa)	baby care	wh
	Stachytarpheta jamaicensis (L.) Vahl	**alata labu** (Sa)	baby care	wh
Viscaceae	*Phoradendron crassifolium* (Pohl ex DC.) Eichler	**katyankama** (Au)	fractures	lvs
Viscaceae	*Phoradendron perrottetii* (DC.) Eichler	**katyankama** (Au)	baby care	lvs
Zingiberaceae	*Aframomum melegueta* K. Schum.	**nengre kondre pepre** (Sr)	**winti**	fr
	Renealmia alpinia (Rottb.) Maas	**gaan masusa** (Sa)	genital bath	r, fr, lvs
	Renealmia floribunda K. Schum.	**pikien masusa** (Sr)	**winti**	wh
	Zingiber officinale Roscoe	**djindja uwii** (Sa)	cold	lvs, r
Various families and species	various species (mixture)	**moeroe dresie** (Sr)	uterus problems	mix
	various species (mixture)	**batra** (Sr)	aphrodisiacs	mix
	various species (mixture)	**babaar oedoe** (Sr)	**winti**	ba
	various species (mixture)	**draai tete** (Sr)	**winti**	wo