



**HAL**  
open science

# Migrant Pharmacopoeias: An Ethnobotanical Survey of Four Caribbean Communities in Amazonia (French Guiana)

Marc-Alexandre Tareau, Alexander Greene, Marianne Palisse, Guillaume Odonne

► **To cite this version:**

Marc-Alexandre Tareau, Alexander Greene, Marianne Palisse, Guillaume Odonne. Migrant Pharmacopoeias: An Ethnobotanical Survey of Four Caribbean Communities in Amazonia (French Guiana). *Economic Botany*, In press, 10.1007/s12231-021-09529-0 . hal-03485418

**HAL Id: hal-03485418**

**<https://hal.science/hal-03485418>**

Submitted on 23 Dec 2021

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Migrant Pharmacopoeias: An Ethnobotanical Survey of Four Caribbean Communities in Amazonia (French Guiana)

Marc-Alexandre Tareau<sup>1</sup>, Alexander Greene<sup>1</sup>,  
Marianne Palisse<sup>1</sup>, and Guillaume Odonne<sup>1</sup>

<sup>1</sup> Laboratoire Ecologie, Evolution, Interactions des Systèmes Amazoniens (LEEISA), CNRS, Université de Guyane, IFREMER, 97300 Cayenne, French Guiana

\*Corresponding author; e-mail: tareau.marc.alexandre@gmail.com

---

French Guiana is an overseas French department in South America at the margin of the Amazon basin. Its population is characterized by an important number of cultural groups. Many inhabitants originate from the Caribbean (mostly Saint Lucia, Martinique, Guadeloupe, Haiti, and the Dominican Republic). The objectives of this study were to present an overview of the main uses of plants among the Caribbean populations in French Guiana, and how they contribute to the dynamics of plant-based practices, in order to provide insights into ethnobotanical convergences, divergences, and hybridizations (such as the importation of new species and associated practices, and the adoption of Amazonian species by Caribbean people). Interviews and botanical voucher collections were conducted throughout the coastal area of French Guiana. Sixteen Saint Lucian, nineteen Haitian, eighteen French Caribbean, and twelve Dominican informants were interviewed during the fieldwork. Altogether they use 212 botanical species. Some plants have recently been imported directly from the Caribbean, while adaptations have also taken place: some species that do not exist locally are abandoned while Amazonian species are integrated to form hybrid pharmacopoeias. The phytotherapies of these communities in French Guiana are still conserved as consistent sets of knowledge, although they tend to blend through an ongoing process of hybridization.

**Keywords:** Amazonia, Saint Lucia, Haiti, Dominican Republic, French West Indies, Diasporas

---

La Guyane française est un département français d'Amérique du Sud situé à la marge nord du bassin amazonien. La composition de sa population est caractérisée par une très grande diversité d'appartenances culturelles. De nombreux habitants sont notamment originaires des Caraïbes (principalement de Sainte-Lucie, Martinique, Guadeloupe, Haïti et de la République dominicaine). Les objectifs de cette étude étaient de présenter une vue d'ensemble des principaux usages de soin par les plantes chez les populations caribéennes de Guyane française, et la manière dont ils contribuent à la dynamique des pratiques de phytothérapie locales, afin d'apporter un éclairage sur les modalités de convergences, de divergences et d'hybridations ethnobotaniques (telles que l'importation de nouvelles espèces et d'usages associés et l'adoption d'espèces amazoniennes par les migrants caribéens) auxquelles elles donnent naissance. Des entretiens et des collectes d'herbiers ont été menés sur l'ensemble de la zone côtière de la Guyane française. Seize informateurs saint-luciens, dix-neuf

---

Received: 6 February 2021; accepted: 8 September 2021; published online \_\_\_\_\_

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s12231-021-09529-0>.

haïtiens, dix-huit caribéens français et douze dominicains ont été interrogés au cours du travail de terrain. Au total, ceux-ci ont mentionné utiliser 212 espèces botaniques. Certaines plantes ont récemment été directement importées des îles de la Caraïbe, et des adaptations ont également eu lieu: certaines espèces qui n'existent pas localement sont progressivement délaissées par les migrants caribéens tandis que, *a contrario*, des espèces amazoniennes sont intégrées à leurs pharmacopées respectives. On observe enfin que les phytothérapies de ces communautés caribéennes de Guyane française conservent un ensemble cohérent de connaissances ethnomédicinales, qui tend cependant à se mélanger dans un processus continu d'hybridation bioculturelle.

**Mots-clés:** Amazonie, Sainte-Lucie, Haïti, République Dominicaine, Antilles Françaises, Diasporas

## Introduction

French Guiana (FG), a French overseas territory located in northeastern South America, is a land of immigration where many populations converge, both from neighboring countries (Brazil, Suriname, Guyana) and from more distant territories (the Caribbean, Peru, Colombia) (Piantoni 2011). Among these populations, some are originally from the Caribbean and bring part of their ethnobotanical practices with them to this Amazonian land, through a process of relocalization (i.e., the mobilization of exogenous knowledge and uses in a new social or environmental context) of plants and plant knowledge (Ladio and Albuquerque 2014). This is the case for the Haitians, who have been continually settling in FG since the 1970s, fleeing the economic, political, and environmental problems of their country. For all the groups, it is difficult to give precise population estimates for the communities in FG. According to Hurpeau (2012), there were 15,880 Haitian-born migrants in French Guiana in 2009 out of a total population of 224,469. However, these relatively old figures should be considered in a context of strong demographic growth—FG had 283,540 inhabitants on January 1, 2019 (INSEE

2020). Cambrézy (2015) analyzes many reasons why migrant population estimates should be taken with caution: difficulties in counting undocumented migrants, questions about how to count underage children born on French soil, and reluctance in France to produce statistics by “ethnic” origin, which does not allow “ethnic” categorization beyond the first generation of migrants or collecting information on the descendants of migrants who, while born in French Guiana consider themselves linked to a Haitian “community.” Thus, according to Granger (2018), there are 25,000 Haitians, but according to Joseph (2020), the Haitian consulate in FG would claim 40,000 nationals.

The Saint Lucian community is another large immigrant group, which for the most part is descended from workers who came during the gold rushes from the end of the nineteenth century and throughout the first half of the twentieth century. Many of them then settled on the coast, where the men frequently worked in agriculture or as sharecroppers for landowners, and became the foundation of certain informal urban neighborhoods (Gorgeon 1985). This population has mixed with Guianese Creoles and the other Creoles of the French West Indies.

The other main Caribbean communities present in French Guiana are from the West Indian islands of Martinique and Guadeloupe, French departments with which FG has important economic and family ties, and from the Dominican Republic. Immigration from Martinique began in 1902 after the catastrophic eruption of Mount Pelée, and continues today (Mam-Lam-Fouck and Anakesa 2013). This migration is often linked to skilled employment; many West Indians are managers, technicians, or secondary school teachers. The small Dominican community represents a mainly economic and political migration, which has increased since the end of the twentieth century (Hurpeau 2012; Piantoni 2011). The Saint Lucian, West Indian, and Dominican communities are primarily present in FG's main cities: Cayenne, Kourou, and Saint-Laurent du Maroni (Hurpeau 2012; Piantoni 2011).

In terms of plant knowledge, however, and despite the literature on the French Guianese herbal pharmacopoeia (Chérubini 1988; Fleury 1991, 2002; Grenand et al. 2004; Odonne et al. 2011, 2017; Tareau 2019; Tareau et al. 2017,

2020), the ethnobiological influences of these populations on the local uses of the medicinal flora has been discussed only in Tareau et al. (2020). Given the significant cross-Caribbean variation in ethnobotanical practices between these communities (Boulogne et al. 2011; Longuefosse and Nossin 1996; Picking et al. 2015; Tramil 1999; Weniger et al. 1986), the dynamics of exchange between them deserve particular attention. In the present survey, we thus present the medicinal plants used by these four communities, and analyze and discuss the characteristics of their practices in the context of migrant ethnobotanical theory (Ceuterick et al. 2008, 2011; Medeiros et al. 2012, 2016; van Andel and van't Klooster 2007; Vandebroek et al. 2007; Volpato et al. 2009). Briefly, from the point of view of a migrant group, the arrival in a new territory demands, on the one hand, adaptation to new environmental and cultural realities and, on the other hand, a search for plant species that will allow the reproduction of cultural practices (Medeiros et al. 2012). It is precisely these phenomena of adaptation to new floras and contact with other cultures that drive the diversification of biocultural systems through mechanisms of hybridization, as developed by Ladio and Albuquerque (2014). Medicinal floras have thus been steadily enriched by these migrant events (Bennett and Prance 2000; Voeks 2004).

Our objectives were 1) to inventory the medicinal floras of Haitians, Saint Lucians, West Indians, and Dominicans in FG; 2) to compare the species used between these groups; and 3) to interpret how these differences are related to migration history, adaptation to the context of settlement, ethnomedicinal theories, and cultural perceptions of biodiversity.

## Material and Methods

This study is based primarily on surveys carried out along the French Guianese coast between January 2016 and June 2017 and complementary interviews carried out between October and December 2020 in Cayenne and Saint-Laurent du Maroni. The first people interviewed were approached informally, on the street, or at their workplace. Then, using snowball sampling (Noy 2008), other respondents

were gradually contacted. They were interviewed by the first author in French, Dominican Spanish, Haitian kreyòl, French West Indian kreyòl, and Saint Lucian kreyòl. As part of the Free Prior Informed Consent (FPIC) process, each interviewee was informed about the objectives of the research, asked for their permission to participate, and assured of their anonymity and right to withdraw their participation at any time. After collecting basic demographic data (age, sex, place of birth, languages, and the like), semi-structured interviews were conducted to determine the most important medicinal species used by each person, the geographical origin of each plant cited and the way of procurement, detailed uses, and methods of administration. The questionnaires (see Electronic Supplementary Material [ESM] 1) focused only on the recent uses of plants by the migrants, to gain insight into their current practice in FG. The semi-purposive sampling took into account different sociodemographic components of the Caribbean community in FG (in terms of age, gender, employment, and ethnicity). However, among the limitations of this study, it should be noted that the relatively small sample sizes are insufficient to analyze, with significant results, medicinal uses instead of species.

The responses to all closed questions were organized in an MS Excel spreadsheet to facilitate quantitative analysis (Heinrich et al. 2009), which was coupled with a complementary qualitative analysis. Qualitative approaches included a thematic analysis (Guest et al. 2011) consisting of systematically identifying, grouping, and then examining the themes addressed in the corpus of interviews.

Voucher specimens of cited plants were collected with the informants as much as possible. They were then processed and deposited at the Cayenne IRD Herbarium (CAY). Botanical determinations were performed by M. A. Tareau and G. Odonne. The taxonomical nomenclature used was the APG IV (Chase et al. 2016).

Use reports (URs), as defined by Phillips and Gentry (1993), correspond to the number of citations of a species in general or for a particular therapeutic indication. URs were compiled for each plant reported in response to the survey. These use reports were then used to generate the percentage of the total number of uses.

The vernacular names or expressions collected are indicated by the following language codes: “dom” for Dominican Spanish, “htk” for Haitian kreyòl, “fwk” for French West Indian kreyòl, and “slk” for Saint Lucian kreyòl.

As exemplified in Tareau et al. (2020), belonging to a cultural group is a subjective feeling, and does not necessarily depend on place of birth or language. Thus, for the purpose of this study the designation of individuals to cultural groups relies on personal, self-reported belonging to a particular community.

## Results

A total of 65 people (36 women and 29 men, with an average age of 42 years old—18 years for the youngest and 87 years for the oldest interviewee) were interviewed for this study. Some were born in the Caribbean and others were born in FG from parents originating from these countries, which is particularly the case for members of the Saint Lucian community.

Within the four communities, both herbalists and lay people were included. However, two elderly Saint Lucian women stood out by citing a very high number of medicinal plants. The interviewees mentioned 212 species (of which 157 were cited at least three times) for a total of 1,280 URs (see ESM 2). Some plants or plant-based products in use in FG were brought directly from an island in the Greater or Lesser Antilles. In fact, 14 URs of plants or plant products from the French West Indies (12 URs from Martinique and 2 URs from Guadeloupe) were recorded, 13 URs from Hispaniola (the island divided between Haiti and the Dominican Republic, with 9 URs and 4 URs, respectively), and 6 URs from Saint Lucia.

### SAINT LUCIAN ETHNOBOTANY

Sixteen people from Saint Lucia (of which 12 were born there) were interviewed during this survey, citing a total of 184 species used for therapeutic purposes (638 URs; or an average of 40 URs per inhabitant interviewed in this community). Among them, 82 species were mentioned at least three times (ESM 2).

Most of the species used by Saint Lucian people residing in FG are exotic and mostly

pan-tropical species. Introduced for the most part during the colonial period, both in the Caribbean islands and in FG, these plants are thus both constitutive of the Saint Lucia “traditional” pharmacopoeia (Fredrich 1978, 1981) and of the French Guianese native medicinal flora (Grenand et al. 2004), which Saint Lucian migrants began to adopt upon their arrival in FG. Interestingly, certain Amazonian species that are not present in Saint Lucia (such as *Astrocaryum vulgare* Mart., *Carapa guianensis* Aubl., *Handroanthus serratifolius* (Vahl) S.O. Grose, *Ocotea guianensis* Aubl., *Mansoa alliacea* (Lam.) A.H. Gentry, and *Siparuna guianensis* Aubl.) also appear in the inventory, indicating the adoption by this community of Amazonian phytotherapeutic practices.

### HAITIAN ETHNOBOTANY

Nineteen people from Haiti living in FG (of which 15 were born there) were interviewed for this study. Just as for the Saint Lucians, the majority of the 93 medicinal species (for 252 URs; or an average of 13 URs per inhabitant interviewed in this community) mentioned by Haitians are pan-tropical species, probably first known by the migrants in Haiti and subsequently recognized and used in FG.

Among the plants mentioned, 30 were cited more than three times during the interviews (ESM 2). Three of these, all pan-tropical species, stand out in regard to their frequency of use, with a total of at least 10 citations: *Momordica charantia* L. (htk: *asosi*, 24 URs), *Ricinus communis* L. (htk: *maskreti*, 15 URs), and *Citrus x aurantium* L. (htk: *zoranj*, 10 URs).

### DOMINICAN ETHNOBOTANY

Twelve people from the Dominican Republic (all born there) living in FG were interviewed. They cited a total of 67 medicinal species (for 141 URs; or an average of 12 URs per person), 19 of which were mentioned more than three times (ESM 2).

Among the medicinal plants in use in the Dominican community of FG, and as already observed in the transnational Dominican community of New York (Vandebroek and Balick 2014), a large number of species are primarily food plants (such as *Allium* spp., *Beta vulgaris*

L., *Cinnamomum verum* J. Presl, *Citrus* spp., *Daucus carota* L., *Passiflora edulis* Sims, and *Zingiber officinale* Roscoe). The most-cited species by this community, *Plectranthus amboinicus* (Lour.) Spreng. (dom: *oregano poleo*, 6 URs), a common condiment, appears to be quite characteristic of this migrant group, as it is seldom cited by the other groups interviewed.

#### FRENCH WEST INDIAN ETHNOBOTANY

Eighteen people from the French West Indies (Martinique and Guadeloupe; all born there) were interviewed. They cited 125 medicinal species and a total of 259 URs (or an average of 32 URs per person). Among them, 26 plants had at least three URs (ESM 2). These are essentially cultivated species, most of which are exotic (a majority are of Asian origin), that were introduced mainly during the colonial period.

The three species most mentioned by this community are pantropical Asian panaceas (*Cymbopogon citratus* (DC.) Stapf, *Aloe vera* (L.) Burm. f., and *Zingiber officinale*). However, compared to the other study communities, certain species seem to be relatively characteristic of the pharmacopoeia of West Indians living in FG. This is notably the case of *Alpinia zerumbet* (Pers.) B.L. Burtt & R.M. Sm. (*atoumo*; 9 URs), *Pimenta racemosa* (Mill.) J.W. Moore (*bwadenn*; 6 URs), and *Neurolaena lobata* (L.) Cass. (*zeb a pik*; 4 URs), which are cited multiple times by this population but seldom or never appear in the inventories of the other groups.

### Discussion

#### AN INEVITABLE PROCESS OF HYBRIDIZATION BETWEEN MIGRANT COMMUNITY PRACTICES

According to Ladio and Albuquerque (2014), ethnobiological hybridizations can result either in the mixing of elements from different systems through contact, or the coexistence of diverse systems, such as is the case in FG urban areas, which are marked by high socio-cultural heterogeneity. In the case of this study, the importation of ethnobotanical practices into a new socio-environmental context is salient, along the subsequent transformations that can be observed in local pharmacopoeias.

#### The Insularization of Caribbean Practices in the Amazon

Several studies have shown that “cultural keystone” species survive migration despite a low availability by being transplanted by migrants (Ceuterick et al. 2011; Garibaldi and Turner 2004). From this perspective, Martinique appears to play a major role in the introduction of species to FG, particularly European species that have long been naturalized in the French West Indies through the process of global botanical exchanges associated to the colonial era. These are essentially cultivated species, relatively rare in FG, coming from the gardens of relatives or purchased in shops and markets, such as *Artemisia absinthium* L. (fwk: *lapsent*, 1 UR), *Artemisia vulgaris* L. (fwk: *larmwaz*, 1 UR), *Pimpinella anisum* L. (fwk: *lanni*, 1 UR), *Scutellaria purpurascens* Sw. (fwk: *soulyé zombi*, 2 URs), *Symphytum officinale* L. (fwk: *konsoud*, 1 UR), or *Tanacetum vulgare* L. (fwk: *lanmant glasyal*, 1 UR). Vegetable oils and manufactured phyto-medicinal remedies are also brought back from these French Caribbean islands with which FG maintains very strong links, as they are both French overseas departments (before the current coronavirus crisis, there were two daily flights connecting Cayenne to Fort-de-France and Pointe-à-Pitre) and share a common colonial history. A medicinal plant processing sector has been emerging for several years and is now very dynamic in Martinique and Guadeloupe. Similarly, medicinal plants, generally non-cultivated in FG, are sometimes brought back by Haitian individuals (*Guazuma ulmifolia* Lam., 2 URs, htk: *bwadòm*; *Haematoxylum campechianum* L., 1 UR, htk: *kanpech*; *Rosmarinus officinalis* L., 1 UR, htk: *romaren*; Dominicans (*Plantago major* L., 1 UR, dom: *llantén*; *Rosmarinus officinalis* L., 2 UR, dom: *romero*; and *Salvia officinalis* L., 1 UR, dom: *salvia*) or Saint Lucians (*Citharexylum spinosum* L., 1 UR, slk: *bwa kotlet* and *Pectis elongata* Kunth, 1 UR, slk: *sitronnel senklisi*) who travel to visit their families. This is also the case of culturally specific phytotherapeutic products such as castor oil (htk: *luil maskreti*) from Haiti or bottles of herbal mixtures brought from the Dominican Republic (dom: *mamajuana*, Figure 1). *Chini tref* alcoholic maceration, associating the leaves of *Aristolochia trilobata* L. and the caterpillar feeding (*Battus polydamas* L.)

**Fig. 1.** Bottle of *mamajuana* from Dominican Republic in a Cayenne bar. Photo by M–A Tareau



on them is frequently brought from Martinique, as this butterfly species is uncommon in FG. Although most of these species are brought as dried herbs, some attempts at transporting live plants were reported, as for *Guazuma ulmifolia*.

Another notable form of hybridization is the relocation of exogenous uses on pre-existing species in FG. For example, it has been observed that the Haitian community uses species such as *Chromolaena odorata* (L.) R.M. King & H. Rob. or *Momordica charantia*, present in FG, in the same way as in Haiti (Weniger et al. 1986), which differs from those observed in other French Guianese communities (Grenand et al. 2004).

#### *Adoptions, Mixtures, Hybridizations*

However, in addition to these importations of plants and associated uses, there also have been local adoptions. Indeed, each of the interviewed communities cited a certain number of Amazonian species present in their hybrid pharmacopoeia (*Astrocaryum vulgare*, *Carapa guianensis*, *Handroanthus serratifolius*, *Ocotea guianensis*, *Mansoa alliacea*, and *Siparuna guianensis*). What is particularly notable is the prominence of food species in these pharmacopoeias. This can be explained by the theory of availability (Albuquerque 2006; Voeks 2004), which postulates that the most accessible species (these food plants are pantropical, therefore known to migrants and widely available in food shops) are more often selected as medicinal plants.

This might be also related to a shared preventative approach that relates food and diseases, and gives some food plants medicinal efficacy. Some of them are also pantropical cultivated herbaceous species, whose worldwide diffusion allows them to integrate into many pharmacopoeias throughout the world (Stepp 2004; Voeks 2004).

On the other hand, there is a certain disparity between communities in terms of the level of knowledge about medicinal plants: the 16 Saint Lucians reported 638 URs and 184 medicinal species, while the 19 Haitians cited only 252 URs and 93 species (respectively, 40 against 13 URs per inhabitant between these two communities). It can be assumed that more recent migrants (like the Haitians) generally cite fewer native species, whose adoption of uses requires a long period of familiarization, while migrants from Saint Lucia, who have been living in FG for a longer period of time, have succeeded in accumulating a greater amount of knowledge during the numerous interactions they have developed with the other populations present in the territory (Tareau et al. 2020). But it should also be pointed out that a sampling bias may also partially explain such disparities, since several major specialists were interviewed among the Saint–Lucians and they alone cited a very large number of species and uses. The urban or rural origin of migrant populations also greatly influences practices. For example, Haitians, who generally come from rural areas and continue to cultivate gardens on the outskirts of the cities where they settle (Palisse 2016, 2020; Palisse and Davy 2018), cite more species than Dominicans who, like them, are recent migrants but who generally come from cities.

Furthermore, proof that plant travel is nourished by incessant and multilateral circulations, the species *Tinospora crispa* (L.) Hook. f. & Thomson, probably introduced into FG in the 1980s by the Javanese community of neighboring Suriname (Grenand, pers. comm.), has become a popular plant in Saint Lucia, where it was brought back and acclimatized by Saint Lucians from FG and is now sold in markets under the name *lyann Kayenn* (“Cayenne liana,” unpublished data).

Finally, linguistic hybridizations are also taking place, as part of the process of adoption of new practices and species by migrants. A *hiatus* often occurs between the adoption of things

and the adoption of the words that designate them in their original context. Phonological distortions (Grenand 2002) of varying degrees of importance appear between the original vernacular names and those that are newly attached to plants, giving rise to new phytonyms. Thus, among the new etymons that we noted is the example of *Melaleuca quinquenervia* (Cav.) S.T. Blake, which has become invasive in the savannas of the French Guianese coast (Stier et al. 2020) and which also has been included into the pharmacopoeia of Haitian migrants, who call it *kalipis savann*, in reference to the genus *Eucalyptus*, with which this species shares both a taxonomic proximity and a similar mentholated smell. Semantic transfers from one language to another (Grenand 2002) can also appear, such as the fact that in the Dominican community the species *Ricinus communis* is named *higuëreta* as often as *pamakristi*, which is its FG kréyòl name.

#### CREOLE ETHNOMEDICINES SHARE SIMILAR CONCEPTS FOR DISEASES AND THE BODY

The four ethnomedicines studied share a certain vision of disease, based on common emic representations of health. Therefore, in societies characterized by significant cultural pluralism, complex and unpredictable “therapeutic itineraries” are observed due to the multiplicity of possible recourses (Janzen and Arkininstall 1995; Massé 2001; Staiano 1981; Staiano-Ross 1986), with multiple back and forth between biomedicine and ethnomedicine, but also between the different components of the latter. Although they often prove to be complementary, the different ethnomedical systems merge very slowly because they also act as strong identity markers and specialize in the treatment of certain culturally specific etiologies and pathologies (Benoist 1986; Benoît 2000). Finally, the porosity among these interconnected medical systems favors the constant evolution of these herbal medicines (Tareau et al. 2020). A humoral logic supported by sensory clues.

The humoral etiologic perspective, considered by some authors to be the main explanatory theory of health in the world (Foster 1994; Foster and Anderson 1978), remains very important in South America (García-Hernández et al. 2015; Geck et al. 2017). In this perspective, two main



types of diseases can occur: those related to a pathological excess of “heat” in the body (fwk, htk, slk: *lenflamasyon*, dom: *calor adentro*) and those resulting from a sudden attack of “cold” (fwk, htk, slk: *lenpridans*, *frédi*; dom: *resfrio*, *imprudencia*), which in both cases will impede the normal flow of body fluids and thus cause more or less serious pathological states.

The four ethnomedicines studied here share this humoral conception and have implemented therapies consisting of trying to avoid these pathologic imbalances through both prophylaxis and a curative approach based on the principle of healing by opposites, as has been shown in other similar humoral–medicine contexts (García-Hernández et al. 2015). In general, strongly aromatic plants (spices like *Cinnamomum verum* and *Zingiber officinale*, or aromatic species such as *Cymbopogon citratus*, *Citrus* spp., or *Alpinia zerumbet*) are considered “hot” and are highly recommended to treat the cold imbalance *lenpridans/imprudencia*, which if not stopped will give rise to bloating, flu symptoms, rheumatism, or generalized pain. Salty decoctions of certain plants (salt is also considered a “hot” ingredient) are also prescribed for “cold” imbalances, as observed in Saint Lucia (Fredrich 1978), Martinique (Peeters 1979), Haiti (Farmer 1988), and the Dominican Republic (Vandebroek and Balick 2014). On the contrary, “cold” substances (fwk, htk, slk: *rafréchi*; dom: *refrescamiento*) fight against “hot” excesses. Wong (1976) also observes in the English–speaking Caribbean that herbal teas called “cooling” are drunk to “cleanse the blood” and combat the state of “heat.” Indeed, in case of an excess of “heat” in the body, the main risk is that the blood that is too hot will liquefy, which can initially lead to strong and regular headaches (because “*the blood rises to the head*”); then, if nothing is done, pathologic disorders of the circulatory system will eventually appear, like hypertension and cardiac disorders. In general, bitter (*Aristolochia trilobata*, *Momordica charantia*, *Phyllanthus amarus* Schumach. & Thonn., *Quassia amara* L., and *Tinospora crispa* (L.) Hook. f. & Thomson), and sour (*Costus spiralis* (Jacq.) Roscoe and *Manihot esculenta* Crantz) plants, considered as “cold,” are preferred in the treatment of this category of pathology:

“Lè san’w lan tro cho li monte nan tet ou.  
Li ba’w maltet, li pe rete bloke nan tet ou

e se sa ki ba’w atak. Moun ki gen san cho, m ba yo bwè asosi pou netwaye san yo a. I anmè an pil [when your blood is too hot it goes up in your head. it gives you a headache, it gets stuck in your head and can cause a heart attack. I give warm–blooded people asosi (M. charantia) to drink to clean their blood. It’s very bitter]” Haitian man living in Cayenne.

This cross–culturalism of medicinal perceptions by migrants from different countries allows easy exchanges of practices between their communities, favoring the dynamism of each of them:

“It was a Creole lady who gave me this remedy to clean my blood. The Creoles know a lot of plants that are good when you have too much heat in your body.” Dominican woman living in Cayenne.

#### *Magical Plants to Prevent or Cure Witchcraft Attacks*

In African–American therapeutic systems in general, illness is never completely decontextualizable from spiritual actions committed by the patient and/or the patients relatives (Bastide 1967; Santiago and Rougeon 2013; Vonarx 2011). These globalizing medicines take into account the individual in a holistic dimension, placing him/her in both his/her human and cosmic environment. The occurrence of diseases in this context is often attributed to magico–religious factors, such as the sending of a bad spell (fwk, slk: *tjenbwa*; htk: *espedisyon*; dom: *brujeria*). This ordinary sorcery often seems to be motivated by conflicts between people but can also be driven, in a much more banal way, by jealousy or love passion. As a general rule, when talking about a spell, a topic around which there is a real taboo, it is appropriate to say that “one has done something” or to talk about “a job” (fwk, htk, slk: *travay*; dom: *trabajo*).

This singular understanding of illness, inseparable from the belief in the constant influence of spiritual forces on physical and mental health, automatically implies a well–adapted medico–magical therapy. In the face of the constant eventuality of being assaulted, modalities

of prevention (propitiatory practices, such as cultivating protective plants around the house) and treatment (expiatory practices, such as the baths of disenchantment) are implemented on a daily basis. Most of the time in the four migrant communities surveyed, the species used for this purpose are species with a strong odor (*Mansoa alliacea*, *Ocimum* spp., *Petiveria alliacea* L., *Piper* spp., and *Pogostemon heyneanus* Benth). These mechanisms of protection, self-defense, and retaliation undoubtedly justify the vitality of magic to this day as a means of social regulation within many populations of FG:

“It is a spiritual warfare, everyone has their own weapons through their plants. I brought my Martinican magical arsenal, but the Amerindians and the Maroons are very, very strong.” Martinican man residing in Saint-Laurent du Maroni.

Moreover, in the same way as for humoral medicine, transfers between communities are made possible by this cultural intercomprehension, allowing, by gradual shifts, changes in the migrants’ pharmacopoeias:

“A Dominican lady gave me this plant [*Petiveria alliacea*], she told me to bathe with it to attract luck. Over there, they call it *anamù* I think, and we call it *ave*. Finally we use the same plants, we do the same things, it’s just the names that change.” Haitian woman living in Cayenne.

#### *Common Care Practices—A Logic of Additive Medicine*

In the four surveyed communities, the consumption of (often bitter) tonics (fwk and slk: *annè l dékolaj*; htk: *tranpé*; dom: *mamajuana*—that are not necessarily bitter tonics) remains an important medicinal practice, as observed throughout the Caribbean (Cano and Volpato 2004; Nossin, 2010; Odonne et al. 2007, 2021; Vandebroek et al. 2010). These preparations are generally composed of a mixture of many plants forming a kind of therapeutic *totum*. Indeed, in these Creole medicines, which can be described as “additive” (Odonne et al. 2017), the efficacy sought is the result of the synergy between the different species and ingredients macerated

together to produce a singular but multifunctional assembly that is more effective than the ingredients in isolation. Bitter plants are usually used, which function in the humoral logic previously discussed to regulate a number of pathological disorders.

In the same “additive” way, decoctions (dom: *té*; htk: *te*; fwk and slk: *dité*), which most often contain several species, are also very popular among the different communities. These hot decoctions/infusions are often drunk sweet, and other ingredients (such as salt, rum, or honey) are frequently added to increase their therapeutic effect as also noted by Friedrich (1978) in Saint Lucia. All these “hot” ingredients participate, in a humoral therapeutic logic, in a curative or preventative action targeted against “cold” pathologies (dom: *resfrio*; fwk, htk and slk: *frédi*, *lagrip*). Sometimes, on the contrary, the infusion or decoction is also prepared in large quantities and then cooled and packaged in bottles to be consumed throughout the day and sometimes over a period of several days (fwk, htk, slk: *tizann*, *rafréchi*). This mode of preparation, considered very “refreshing,” can be indicated as a preliminary to an annual purge or indicated in the treatment of “hot” diseases, from a humoral perspective.

Some species are particularly used in this way, with strong cultural preferences underlined by our survey: *Plectranthus amboinicus* by Dominicans; *Alpinia zerumbet*, *Cymbopogon citratus*, and *Zingiber officinale* by French West Indians; *Citrus x aurantium*, *Annona muricata* L., and *Chromolaena odorata* in the Haitian community; and *Citrus aurantiifolia* (Christm.) Swingle, *Annona squamosa* L., and *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson in Saint Lucian phytotherapy.

Finally, vegetal bathes (fwk, htk, slk: *ben féyaj*; dom: *baño de limpieza*) constitute another important mode of treatment, which seems to be based on a number of common conceptions relating to the permeability and conductivity of the epidermis (Vernon 1992). Moreover, bitter plants (*Aloe vera*, *Momordica charantia*, and *Solanum leucocarpum* Dunal) are often used for this treatment as an external method to act on internal humoral dysfunctions.

## Conclusion

This study shows the presence and dynamism of knowledge from the Caribbean in FG. This is not surprising, considering that FG has long been a crossroads between Amazonia and the Caribbean. Indeed, in FG, where these medicines were established through the more or less recent settlement of migrants from the Antillean islands, the different migrant communities have maintained a common background in terms of perception of the body and disease (in particular humoral systems and magical beliefs) and modes of administration of the medicinal species used. Differences in plant-based practices and knowledge connected to the four communities can nevertheless be observed, particularly at the level of the selected medicinal floras used by each of the communities. These are influenced by factors such as the rather urban or rural origin of the populations as well as their length of time in the country and the level of intercultural interactions that they experienced.

If this study shows that the number and nature of the species used can vary greatly between migrant groups, highlighting the significant bio-cultural dynamics initiated by migratory flows, it would nevertheless be interesting to compare the ethno-medicinal common base to these four Afro-American Caribbean groups with other Afro-descendant communities such as the Maroons present in FG and Suriname.

## Acknowledgements

This work was funded by an *Investissement d'Avenir* grant from the Agence Nationale de la Recherche (CEBA: ANR-10-LABX-25-01) and by the PRIME/80-DiapoREs project from the MITI-CNRS. The authors would like to warmly acknowledge all the people who agreed to participate in the surveys in French Guiana.

## Declarations

We worked in accordance with the recommendations of the Code of Ethics of the International Society of Ethnobiology. Informed consent forms were given to all the respondents in order to present and explain to them clearly the objectives of this research project and to obtain their signed agreement to participate. Each of the interviewees was informed beforehand of the confidentiality of this study, and of his/her right to withdraw its participation at any time, and of the objective of publication at the end under the form of a scientific publication.

## Literature Cited

- Albuquerque, U. P. 2006. Re-examining hypotheses concerning the use and knowledge of medicinal plants: A study in the Caatinga vegetation of NE Brazil. *Journal of Ethnobiology and Ethnomedicine* 2:30–38.
- Bastide, R. 1967. *Les Amériques noires*. L'Harmattan. Paris: Payot.
- Bennett, B. C. and G. T. Prance. 2000. Introduced plants in the indigenous pharmacopoeia of northern South America. *Economic Botany* 54:90–102.
- Benoist, J. 1986. La question de l'efficacité en anthropologie médicale. In: *Colloque Médecines du monde*, 91–98. Paris: Editions de l'IRD.
- Benoît, C. 2000. *Corps, jardins, mémoires*. Anthropologie du corps et de l'espace à la Guadeloupe, Paris: CNRS Editions.
- Boulogne, I., L. Germosén-Robineau, H. Ozier-Lafontaine, M. Fleury, and G. Loranger-Merciris. 2011. TRAMIL ethnopharmacological survey in Les Saintes (Guadeloupe, French West Indies): A comparative study. *Journal of Ethnopharmacology* 133(3):1039–1050. <https://doi.org/10.1016/j.jep.2010.11.034>.
- Cambrézy, L. 2015. Immigration et statistiques en Guyane. *Autrepart* 12:193–214.
- Cano, J. H. and G. Volpato. 2004. Herbal mixtures in the traditional medicine of Eastern Cuba. *Journal of Ethnopharmacology* 90:293–316. <https://doi.org/10.1016/j.jep.2003.10.012>.
- Ceuterick, M., I. Vandebroek, and A. Pieroni. 2011. Resilience of Andean urban ethnobotanics: A comparison of medicinal plant use among Bolivian and Peruvian migrants in the United Kingdom and in their countries of origin. *Journal of Ethnopharmacology* 136:27–54. <https://doi.org/10.1016/j.jep.2011.03.038>.
- Ceuterick, M., I. Vandebroek, B. Torry, and A. Pieroni. 2008. Cross-cultural adaptation in urban ethnobotany: The Colombian folk pharmacopoeia in London. *Journal of Ethnopharmacology* 120:342–359. <https://doi.org/10.1016/j.jep.2008.09.004>.
- Chase, M. W., M. J. M. Christenhusz, M. F. Fay, J. W. Byng, W. S. Judd, D. E. Soltis, D. J. Mabberley, A. N. Sennikov, P. S. Soltis, and P. F. Stevens. 2016. An update of the Angiosperm Phylogeny Group classification for the

- orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society* 181:1–20.
- Chérubini, B. 1988. Jardins médicinaux urbains de guérisseurs en Guyane française: Un réseau haïtien. *Ecologie Humaine* 6:1.
- Farmer, P. 1988. Bad blood, spoiled milk: Bodily fluids as moral barometers in rural Haiti. *American Ethnologist* 15:62–83.
- Fleury, M. 1991. Busi–Nenge, les hommes–forêt: Essai d’ethnobotanique chez les Aluku (Boni) en Guyane française. Thèse de doctorat, Université de Paris.
- Foster, G. M. 1994. Hippocrates’ Latin American legacy: Humoral medicine in the New World. Langhorn, Pennsylvania: Taylor & Francis.
- Foster, G. M. and B. G. Anderson. 1978. *Medical anthropology*. New York: John Wiley & Sons.
- Fredrich, B. E. 1978. Dooryard medicinal plants of St. Lucia. *Yearbook of the Association of Pacific Coast Geographers* 40: 65–78. <https://doi.org/10.1353/pcg.1978.0001>.
- Fredrich, B. E. 1981. A prospective St. Lucian folk medicine survey. *Social Science & Medicine*. Part D: Medical Geography, Special Issue: Medical Geographic Research in Latin America 15:435–437. [https://doi.org/10.1016/0160-8002\(81\)90038-1](https://doi.org/10.1016/0160-8002(81)90038-1).
- García-Hernández, K. Y., H. Vibrans, M. Rivas-Guevara, and A. Aguilar-Contreras. 2015. This plant treats that illness? The hot–cold system and therapeutic procedures mediate medicinal plant use in San Miguel Tulancingo, Oaxaca, Mexico. *Journal of Ethnopharmacology* 163:12–30. <https://doi.org/10.1016/j.jep.2015.01.001>.
- Garibaldi, A. and N. Turner. 2004. Cultural keystone species: Implications for ecological conservation and restoration. *Ecology and Society* 9(3): Article 1.
- Geck, M. S., S. Cabras, L. Casu, A. J. Reyes García, and M. Leonti. 2017. The taste of heat: How humoral qualities act as a cultural filter for chemosensory properties guiding herbal medicine. *Journal of Ethnopharmacology* 198:499–515. <https://doi.org/10.1016/j.jep.2017.01.027>.
- Gorgeon, C. 1985. Immigration clandestine et bidonvilles en Guyane, les Haïtiens à Cayenne. *Revue Européenne des Migrations Internationales* 1:143–158. <https://doi.org/10.3406/remi.1985.970>.
- Granger, S. 2018. As Migrações De Haitianos Na Guiana Francesa: Novas Dinâmicas. *Temáticas* 25(49). <https://doi.org/10.20396/tematicas.v25i49/50.11128>.
- Grenand, F. 2002. Stratégies de nomination des plantes cultivées dans une société tupi–guarani, les Wayãpi. *Amerindia* 26–27:209–247.
- Grenand, P., C. Moretti, H. Jacquemain, and M.-F. Prévost. 2004. *Pharmacopées traditionnelles en Guyane: Créoles, wayãpi, palikur*. Marseille, France: IRD Éditions.
- Guest, G., K. M. MacQueen, and E. E. Namey. 2011. *Applied thematic analysis*. Thousand Oaks, California: SAGE Publications.
- Heinrich, M., S. Edwards, D. E. Moerman, and M. Leonti. 2009. Ethnopharmacological field studies: A critical assessment of their conceptual basis and methods. *Journal of Ethnopharmacology* 124:1–17. <https://doi.org/10.1016/j.jep.2009.03.043>.
- Hurpeau, B. 2012. *Panorama de la population immigrée en Guyane. Pointe-à-Pitre, Guadeloupe: INSEE Antilles–Guyane.*
- INSEE. 2020. <https://www.insee.fr/fr/statistiques/4177174?sommaire=4177618&geo=REG-03>.
- Janzen, J. M. and W. Arkinstall. 1995. *La quête de la thérapie au Bas-Zaïre*. Paris: KARTHALA Editions.
- Joseph, H. 2020. O sistema migratório haitiano nas guianas: Para além das fronteiras. *Dialogos* 24(2):228–258.
- Ladio, A. H. and U. P. Albuquerque. 2014. The concept of hybridization and its contribution to urban ethnobiology. *Ethnobiology and Conservation* 3(6):1–9. <https://doi.org/10.15451/ec2014-11-3.6-1-9>.
- Longuefosse, J.-L. and E. Nossin. 1996. Medical ethnobotany survey in Martinique. *Journal of Ethnopharmacology* 53:117–142. [https://doi.org/10.1016/0378-8741\(96\)01425-0](https://doi.org/10.1016/0378-8741(96)01425-0).
- Mam-Lam-Fouck, S. and A. Anakesa. 2013. *Nouvelle histoire de la Guyane*. Paris: Ibis Rouge Editions.
- Massé, R. 2001. Métissage des savoirs et itinéraires de soins et de santé mentale dans la Martinique d’aujourd’hui. In: *Paradoxes du métissage*, ed., de Jean-Luc Bonniol, 145–158. Paris: Comité des Travaux historiques et scientifiques.

- Massé, R., U. P. Albuquerque, D. B. de Oliveira Abreu, T. C. da Silva, W. S. Ferreira Junior, M. A. Ramos, and A. H. Ladio. 2016. What drives the use of natural products for medicinal purposes in the context of cultural pluralism? *European Journal of Integrative Medicine* 8(4):471–477. <https://doi.org/10.1016/j.eujim.2016.03.012>.
- Medeiros, P. M., G. T. Soldati, N. L. Alencar, I. Vandebroek, A. Pieroni, N. Hanazaki, and U. P. Albuquerque. 2012. The use of medicinal plants by migrant people: Adaptation, maintenance, and replacement. *Evidence-Based Complementary and Alternative Medicine* 2012:807452. <https://doi.org/10.1155/2012/807452>.
- Nossin, E. 2010. *Plantes magiques de la Martinique, Guadeloupe et des Petites Antilles: Livre I. Fort-de France, Martinique: L'Harmattan.*
- Noy, C. 2008. Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. *International Journal of Social Research Methodology* 11:327–344. <https://doi.org/10.1080/13645570701401305>.
- Odonne, G., F. Berger, D. Stien, P. Grenand, and G. Bourdy. 2011. Treatment of leishmaniasis in the Oyapock basin (French Guiana): A K.A.P. survey and analysis of the evolution of phytotherapy knowledge amongst Wayãpi Indians. *Journal of Ethnopharmacology* 137:1228–1239. <https://doi.org/10.1016/j.jep.2011.07.044>.
- Odonne, G., G. Bourdy, J. Beauchêne, E. Houël, D. Stien, L. Chevolut, and E. Deharo. 2007. From Tonic-cups to Bitter-cups: Kwasi bita beker from Suriname: Determination, past and present use of an ancient galenic artefact. *Journal of Ethnopharmacology* 110:318–322. <https://doi.org/10.1016/j.jep.2006.09.045>.
- Odonne, E. Houël, G. Bourdy, and D. Stien. 2017. Treating leishmaniasis in Amazonia: A review of ethnomedicinal concepts and pharmaco-chemical analysis of traditional treatments to inspire modern phytotherapies. *Journal of Ethnopharmacology* 199:211–230. <https://doi.org/10.1016/j.jep.2017.01.048>.
- Odonne, E. Houël, M.-A. Tareau, and T. van Andel. 2021. Geopolitics of bitterness: Deciphering the history and cultural biogeography of *Quassia amara* L. *Journal of Ethnopharmacology* 267:113546. <https://doi.org/10.1016/j.jep.2020.113546>.
- Palisse, M. 2016. Les pratiques agricoles des migrants haïtiens en Guyane: entre insertion et stigmatisation. In: *Mobilités, Ethnicités, Diversité Culturelle: La Guyane Entre Suriname et Brésil*, eds., G. Collomb and S. Mam-Lam-Fouck, 189–206. Matoury, Guyane: Ibis Rouge Editions.
- Palisse, M. 2020. Migration et agriculture périurbaine, les jardins des Haïtiens du Mont Mahury, dans l'agglomération de Cayenne. *Habiter la ville ou la fabrique de la cité vol 2*. Paris: L'Harmattan.
- Palisse, M. and D. Davy. 2018. Des cultures foncièrement différentes. Usages de la terre chez les Amérindiens et les migrants haïtiens en Guyane. *Études rurales* n° 202, 158–177.
- Peeters, A. 1979. La pocaution cé manman félicité. *Communications* 31:130–144. <https://doi.org/10.3406/comm.1979.1474>.
- Phillips, O. and A. H. Gentry. 1993. The useful plants of Tambopata, Peru: II. Additional hypothesis testing in quantitative ethnobotany. *Economic Botany* 47:33–43.
- Piantoni, F. 2011. *Migrants en Guyane*. Arles, France: Actes Sud.
- Picking, D., R. Delgoda, N. Younger, L. Germosén-Robineau, I. Boulogne, and S. Mitchell. 2015. TRAMIL ethnomedicinal survey in Jamaica. *Journal of Ethnopharmacology* 169:314–327. <https://doi.org/10.1016/j.jep.2015.04.027>.
- Santiago, J. P. and M. Rougeon. 2013. *Pratiques religieuses Afro-Américaines: Terrains et expériences sensibles*. Louvain-la-Neuve, Belgium: Editions Academia.
- Staiano, K. V. 1981. Alternative therapeutic systems in Belize: A semiotic framework. *Social Science & Medicine. Part B: Medical Anthropology* 15:317–332.
- Staiano-Ross, K. 1986. Interpreting signs of illness: A case study in medical semiotics. Berlin: Walter de Gruyter.
- Stepp, J. R. 2004. The role of weeds as sources of pharmaceuticals. *Journal of Ethnopharmacology* 92:163–166.
- Stier, A., W. D. De Carvalho, S. Rostain, F. Catzefflis, O. Claessens, M. Dewynter, D. Mckey, K. Mustin, M. Palisse, and B. De Thoisy. 2020. The Amazonian savannas of French Guiana: Cultural and social

- importance, biodiversity, and conservation challenges. *Tropical Conservation Science* 13:1940082919900471.
- Tareau, M.-A. 2019. Les phytothérapies du littoral guyanais: Regard ethnobotanique sur une pharmacopée métissée. Thèse de doctorat, Université de Guyane, France. <https://hal.archives-ouvertes.fr/tel-02452873>.
- Tareau, M.-A., A. Bonnefond, M. Palisse, and G. Odonne. 2020. Phytotherapies in motion: French Guiana as a case study for cross-cultural ethnobotanical hybridization. *Journal of Ethnobiology and Ethnomedicine* 16:54. <https://doi.org/10.1186/s13002-020-00404-1>.
- Tareau, M.-A., M. Palisse, and G. Odonne. 2017. As vivid as a weed... Medicinal and cosmetic plant uses amongst the urban youth in French Guiana. *Journal of Ethnopharmacology* 203:200–213. <https://doi.org/10.1016/j.jep.2017.03.031>.
- Tramil. 1999. Pharmacopée végétale caribéenne: le dictionnaire des plantes médicinales. Fort-de-France, Martinique: Editions Desormeaux.
- van Andel, T. R. and C. van't Klooster. 2007. Medicinal plant use by Surinamese immigrants in Amsterdam, the Netherlands. *Travelling Cultures and Plants: The Ethnobiology and Ethnopharmacy of Migrations* 7:122–144.
- Vandebroek, I. and M. J. Balick. 2014. Lime for chest congestion, bitter orange for diabetes: Foods as medicines in the Dominican community in New York City. *Economic botany* 68:177–189.
- Vandebroek, I., M. J. Balick, A. Ososki, F. Kronenberg, J. Yukes, C. Wade, F. Jiménez, B. Peguero, and D. Castillo. 2010. The importance of botellas and other plant mixtures in Dominican traditional medicine. *Journal of Ethnopharmacology* 128:20–41. <https://doi.org/10.1016/j.jep.2009.12.013>.
- Vandebroek, I., M. J. Balick, J. Yukes, L. Durán, F. Kronenberg, C. Wade, A. L. Ososki, L. Cushman, R. Lantigua, and M. Mejia. 2007. Use of medicinal plants by Dominican immigrants in New York City for the treatment of common health conditions. A comparative analysis with literature data from the Dominican Republic. *Traveling cultures and plants. The Ethnobiology and Ethnopharmacy of human migrations. Studies in Environmental Anthropology and Ethnobiology* 7:39–63.
- Vernon, D. 1992. Les représentations du corps chez les Noirs Marrons Ndjuka du Surinam et de la Guyane française. Paris: Editions de l'ORSTOM.
- Voeks, R. A., 2004. Disturbance pharmacopoeias: Medicine and myth from the humid tropics. *Annals of the Association of American Geographers* 94:868–888.
- Volpato, G., D. Godínez, and A. Beyra. 2009. Migration and ethnobotanical practices: The case of tifey among Haitian immigrants in Cuba. *Human Ecology* 37:43–53.
- Vonarx, N. 2011. Le Vodou haïtien. Entre médecine, magie et religion. Rennes, France: Presses universitaires de Rennes.
- Weniger, B., M. Rouzier, R. Daguilh, D. Henrys, J. H. Henrys, and R. Anton. 1986. La médecine populaire dans le plateau central d'Haïti. 2 Inventaire ethnopharmacologique. *Journal of Ethnopharmacology* 17:13–30.
- Wong, W. 1976. Some folk medicinal plants from Trinidad. *Economic Botany* 30:103–142.