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Research Paper

Herbal medicine in the Marquesas Islands



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ABSTRACT

Ethnopharmacological relevance: This manuscript reports data on medicinal plants used in Marquesas Islands traditional medicine. The subject is interesting due to the extreme geographical isolation of this archipelago and the scarcity of data on this subject. The hypothesis of the authors was that traditional knowledge in this area should be consequently largely preserved.

The usual ethnobotanical collection of use/symptom was completed by an additional quantitative ethnobotany analysis providing two indices: the relative frequency of plant uses for a given affliction (RF) and the Informant Consensus Factor (ICF).

Materials and methods: Our ethnopharmacological study was carried out between 2009 and 2012 in several parts of the archipelago by collecting the accurate names of the medicinal plants, their uses, the methods of preparation of the remedies and the associated traditional nosology. Two methods were applied: *ex situ* focus groups with scientists and local association partners, using fresh plant specimens, dried specimens, and photographs, guided by an outline of simple questions, and *in situ* semi-structured interviews of informants during walk in the woods or homegarden sampling.

Results: 96 plant species were pointed out as medicine for which we collected 1774 use reports; 77 of these species cited by more than 1 informant are listed with their frequency of use.

Three species account for one-third of use reports: *Cocos nucifera* (coconut), *Gardenia taitensis* (tiare Tahiti) and *Microsorium grossum*.

Native species (either indigenous or endemic) represent only one quarter of all used species. The Polynesian introductions (plants introduced during Polynesian migrations) represent 42% of the Marquesan medicinal plants. On the other hand, one-third are modern introductions, introduced, for most of them, less than 200 years ago.

Diseases are analyzed according to Marquesan concepts. In the present study, a special attention was focused on the descriptions of the local diseases. Their translation in French was discussed and verified in focus groups involving both scientists and Marquesan language specialists from the "Académie des Marquises".

40 plant species showed a high frequency of citation for a given affliction (RF > 20). Despite the complex nosology the ICF to Marquesan traditional illness categories showed generally high ICF values, suggesting their strong coherence.

Conclusions: An overview of the Marquesan pharmacopoeia, linked with ethnomedicinal practices, is presented in this paper. Marquesan traditional medicine survived until now despite the culture shock faced by the Marquesan population switching to numerous introduced plants commonly found in their close environment and easily gathered.

Marquesan herbal medicine appears to draw its inspiration from a common Polynesian root. However further investigations on Marquesan nosologies are necessary to appreciate the originality of the Marquesan pharmacopoeia.

Finally, the crossing of ICF and RF indices shows that 36 species have at least one significant use (frequencies > 20%) with high ICF value (> 0.5). This suggests that some key phytochemical

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ingredients may be present in these plants which require further phytopharmacological studies to a better knowledge of their medicinal properties.

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1. Introduction

Despite important economic and cultural changes during the last decades, the practice of Polynesian herbal medicine is still alive in most Polynesian islands. Several ethnobotanical surveys on various archipelagos have been published: Hawaii (Abbott and Shimazu, 1985; 'Ohukani'ohi'a Gon, 2008), Pohnpei–Micronesia (Balick, 2014) Samoa (Cox, 1993), Tonga (Whistler, 1985), Cook (Whistler, 1985, 1991). However there are very few recent ethnobotanical studies on French Polynesia.

The oldest observations regarding the Marquesas Islands are found in the narratives of the first explorers, for example the "Journal of a Voyage to the South Seas", published by James Cook in 1773 after his first Pacific voyage in the company of botanist Joseph Banks. During the French colonial period, Jardin (1858) and Jouan (1858), two naval officers who stayed in the Marquesas Islands for a few years, published some observations on the traditional use of plants. In the 20th century, many species described by Brown (1931, 1935) during his expeditions in several archipelagos of French Polynesia can be found in the Bishop Museum of Hawaii, often accompanied by numerous indications on their uses.

More recent works deal with plant uses in Polynesian traditional medicine (Grépin and Grépin, 1980; Grand, 2007; Lemaître, 1985, 1989). Butaud et al. (2008) supply numerous indications on the uses of Polynesian trees. Pétard (1986) remains the only recent reference for French Polynesian medicinal plants; however this book contains few references to the Marquesas Islands.

Our ethnopharmacological study was carried out between 2009 and 2012 in the Marquesas Islands (Fig. 1) by collecting the Marquesan names of the medicinal plants, their uses, the methods of preparation of the remedies and the associated traditional nosology. The Marquesas archipelago is the most remote archipelago in the world, located more than 5000 km from the nearest continent and lying about 1300 km northeast of Tahiti. Our hypothesis was that traditional knowledge remains largely preserved there due to the extreme remoteness of the islands and isolated valleys.

In order to prioritize plant species for their therapeutic interest or for further pharmacological investigations, we completed the usual ethnobotanical collection of use/symptom by an additional quantitative ethnobotany analysis. This approach reduces researcher subjectivity and intrusiveness by providing indices about the use value and the cultural value of the medicinal plants, the impact of current practices on the resources and the validity of our interpretation of the registered uses.

2. Material and methods

2.1. Geographic coverage

The Marquesas archipelago is one of the five administrative divisions of French Polynesia.

The ethnopharmacological study was carried out in the six major inhabited volcanic Islands: Nuku Hiva, Ua Huka and Ua Pou (NM: Northern Marquesas), Hiva Oa, Fatu Hiva and Tahuata (SM: Southern Marquesas).

2.2. Fields methods

Two methods were applied:

- *In situ* semi-structured interviews of informants during walks in the woods or homegarden sampling. The semi-structured interviews followed the one used for TRAMIL surveys (Boulogne et al., 2011), but were adapted to local conditions.
- Several *ex situ* focus groups were organized with multidisciplinary scientists (botanists, ethnobotanists, pharmacists...) and local associations. Fresh or dried plant specimens, and photographs were showed to local partners to collectively verify or confirm the Marquesan name of plant and use of plants collected during field work, guided by a simple questionnaire highlighting the local name, the therapeutic indication, the mode of application or prevalence as follows: "Do you know this plant?" "What is its Marquesan vernacular name?"; "Do you use this plant? How do you proceed for that use? When did you last use it?"

Translations of disease names in terms of the modern biomedical model were collectively validated during focus groups with scientists and local association partners.

The information obtained from the survey was compared with the already existing literature (Table 1).

2.3. Plants collection

The collected plants except common food plants were pressed and dried for the herbaria collection. They were first identified by JF Butaud, a botanist among our group, and for some taxa, by the taxonomist Jacques Florence from MNHN-Paris, by comparison to vouchers taking into account recent taxonomic revisions (Lorence and Wagner 2011). The voucher specimens are deposited in the French Polynesian Herbarium (PAP; <http://www.herbier-tahiti.pf>) located in the "Musée de Tahiti et des îles", Punaauia, Tahiti.

2.4. Participants and Prior Informant consent (PIC)

The ethnobotanical surveys in all of the inhabited islands of the archipelago were conducted with 102 informants, selected by peer recommendations. The cohort included 102 informants from 40 to 80 years old, 35 males and 67 females, 62 were from southern Marquesas islands and 40 informants from Northern Marquesas. All interviews were realized in the Marquesan language with the aid of an interpreter from the Académie des Marquises, specialist of the Marquesan language.

There is currently no ABS (Access and Benefit Sharing) practice in Polynesia. So we developed and implemented our own ethical approach. Before beginning the ethnobotanical survey, the legal representatives of the municipalities were contacted and informed of the objectives of the project. A meeting was then held with the representatives of a local cultural association and project partner ("Académie des Marquises") and of local community members to whom we presented the targets of the research project. Each informant was asked if he accepted to participate in the project and consented that the registered data could be published. In case of refusal, the registered data were conserved by the cultural association.

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