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# Biodiversity of Medicinal Plants by Minangkabau Ethnic in Guguak Sarai, West Sumatera, Indonesia

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**Abstract.** The research was carried out in Guguak Sarai, West Sumatera, Indonesia. The purpose of this study was to document the diversity of medicinal plants by Minangkabau ethnic base on local knowledge. Data were collected using ethnobotanical approach through open-ended, semi-structured interview and exploration method. The sample consisted of 3 key informants and 94 respondents with provisions age  $\geq 30$  years old. Data were analyzed qualitatively using descriptive statistics. Total 158 medicinal plants species which belongs to 124 genera and 54 families were reported to be used in against 52 diseases. Among the diseases, gastrointestinal disorders had the highest number of medicinal plants to be used (37 species), skin diseases (36 species), postpartum cures (29 species), urinary tract disorders (26 species) and rheumatism (19 species). Fabaceae (Leguminosae) was the dominant families that used to treat the illness (12 species) followed by Euphorbiaceae, Lamiaceae, Poaceae (10 species) and Asteraceae (9 species).

**Keywords:** biodiversity, medicinal plants, minangkabau ethnic.

## INTRODUCTION

Medicinal plants contain substances that believe to cure illness and health care [1]. The active compounds in medicinal plants have the potential for material of modern a drug [2]. About 80 % of the world's population rely heavily on the use of plants and plant extracts for medical purposes [3]. This shows the importance of medicinal plants for public health although not many people realized have the knowledge about it.

Degradation on the knowledge of medicinal plants has been reported from many parts of the world. This condition is caused by the trend of using modern medicine [4], the acculturation process [5], the lack of interest of young generation about medicinal plants knowledge [6], and lack of oral knowledge system transfer [7]. The degradation on the knowledge of medicinal plants and utilization in general linked to the existence of medicinal plants in nature [8]. The loss of medicinal plants diversity in line with the knowledge degradation about the medicinal plants utilization [9]. Therefore, it is important to do more researches that contribute to documents the local knowledge of medicinal plants. Documentation is one of the most effective methods to maintain the knowledge of medicinal plants.

Several ethnobotany researches in Sumatera have been carried out, for example, the use of plants by Kubu people [10], medicinal and ritual plants of Serampas [11], and plants in the traditional ceremony in Kerinci [12]. Ethnobotany research in Minangkabau ethnic has been done, for example, the plants used in *balimau* tradition [13], *batagak panghulu* ceremonial [14], and the plants used in Minangkabau traditional food [15]. These studies showed the diversity of plants use in general and do not discuss medicinal plants specifically. Ethnomedicine research in Minangkabau ethnic has been conducted at Kubang nan Raok village [16] and Ngarai Sianok area [17]. The last study was conducted about 8 years ago, so an updated study is urgently needed.

## METHODS

Data were collected using ethnobotanical approach through open-ended, semi-structured interview and exploration method [18]. Two main sources of information have been selected. These include the 3 key informants and 94 people as general respondents. The key informants were 3 people who are chosen base on deep knowledge and experience in the medicinal plants being utilized [19]. The respondents amount to 94 people (48 men, 46 women) with the provisions age  $\geq 30$  years old. The data were analyzed using descriptive statistics to illustrate the description and the ethnomedicine knowledge of Minangkabau ethnic. The voucher specimens were collected using exploration method. Determination of voucher specimens was conducted in Research Center for Spices and Medicinal Plants (BALITRO) Solok, Herbarium of Biology Department, Faculty of Mathematics and Natural Sciences, Universitas Indonesia; and Research Center for Biology, Indonesia Institute of Sciences (LIPI).

## RESULTS AND DISCUSSION

### General Condition of Study Site

The study site is located in *nagari* Guguak Sarai, West Sumatera, Indonesia. The village cover an area 225.18 hectares. Daily temperature is 23 °C. The majority ethnic in *nagari* Guguak Sarai is Minangkabau ethnic (90 %). The public health facilities in *nagari* Guguak Sarai only supporting public health care. The lack of health facilities is one of the reasons for local people in this villages to remain using plants in medical practice.

### The Local Knowledge and Diversity of Medicinal Plants

A total number of 158 species (124 genera; 54 families) were used by Minangkabau ethnic in *nagari* Guguak Sarai. Families with the highest number of species used are Fabaceae (Leguminosae) (12 species), Euphorbiaceae, Poaceae, Lamiaceae (each of 10 species), and Asteraceae (9 species), while each of the others 36 families contributing (46 species) represented by one or two species (Table 1).

One of the species of Fabaceae (Leguminosae) that are being used by local communities is *kacang kayu* (*Cajanus cajan* (L) Huth.) to cure *biriang*. *Biriang* characterized by red skin, swollen, itchy and sometimes watery. The *cajanuslactone coumarin* content of the leaves of *C. cajan* have potential as an antibacterial agent [20]. Other species in the Leguminosae that used is *kacang tujuh halai daun* (*Phaseolus lunatus* Haberle.), which use to cure cough, *patai cino* (*Leucaena leucocephala* (Lam.) de Wit) in back pain healing, *cangkiang* (*Erythrina fusca* Lour.) and *sikajuik* (*Mimosa pudica* Mill.) to cure asthma.

There are eight genera from Euphorbiaceae that have been used by local people, such as *Euphorbia* (*E. heterophylla*, *E. hirta*); *Jatropha* (*J. multifida*, *J. curcas*); and *Ricinus* (*R. communis*). The members of Euphorbiaceae are used to cure such as cold, fever, injury, ear pain, constipation, and urinary tract disorders. The high utilization of Euphorbiaceae also has been recorded in Hafsa-Fulani tribe, Nigeria [21] and local communities Akwa Ibom, Nigeria [22].

The uses of Poaceae also have been recorded, species such as *sikumpai* (*Sacciolepis interrupta* Stapf) to cure cold and fever, *rumpuik banto* (*Leersia hexandra* Sw.), *tabu udang* (*Saccharum officinarum* L.), *kalkaji* (*Andropogon aciculatus* Retz.), and *lalang* (*Imperata cylindrica* (L.) P. Beauv.) to relieve cough. Poaceae widely used as a medicinal plant because it is easily found around the settlement. Besides the use as the medicinal plant in magh or skin diseases, some Poaceae such as rice (*Oryza sativa* L.), *jaguang* (*Zea mays* L.), and *sarai* (*Cymbopogon citratus* Stapf.) are also being used as food plants.

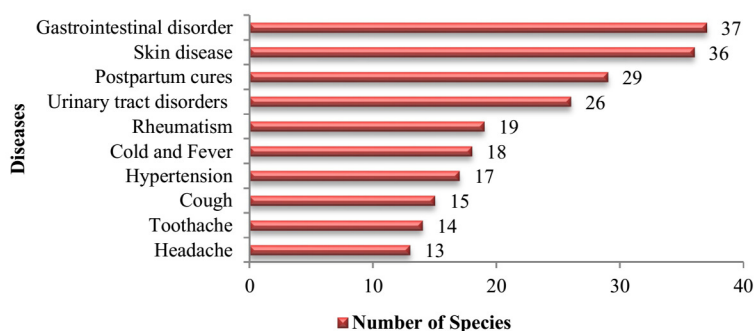
Lamiaceae is the family with high diversity and usually widely distributed [23]. Members of Lamiaceae generally herbaceous and shrubs, so it is easily obtained by local communities. Besides that, members of Lamiaceae rich in aromatic essential oils, tannins, saponins and organic acids which are the pain reliever, diuretic, tonic, antifungal, antimicrobial and antiseptic [24] so that fits used by people in health treatment. The use of species from Lamiceae by local communities such as *bangun bangun* (*Coleus amboinicus* Lour.) to cure painful menstruation, *galundi* (*Vitex trifolia* L.) to cure *dek kuro/padingin* (symptoms such as cold and fever), *sunguik kuciang* (*Orthosiphon grandiflorus* Bold) to cure *sakik rajo* (lumbago), and *silasiah* (*Ocimum basilicum* L.) to relieve the influenza. The high number of species used in this family for the also has been recorded in the local communities at Atlantic Forest region, Pernambuco Brazil [25]; Sardinia and Sicily [26]; Hani, Yunnan-China [27]; Serampas [11]; Skardu valley, Pakistan [19]; and Parbat, Nepal [28].

**TABLE 1.** The diversity of medicinal plants in Minangkabau ethnic, *nagari* Guguak Sarai, West Sumatra.

Family	Number of genera	Percentage of genera	Number of species	Percentage of species*
Fabaceae	12	10 %	12	8 %
(Leguminosae)				
Euphorbiaceae	8	6 %	10	6 %
Poaceae	8	6 %	10	6 %
Lamiaceae	6	5 %	10	6 %
Asteraceae	9	7 %	9	6 %
Rutaceae	4	3 %	7	4 %
Solanaceae	4	3 %	7	4 %
Zingiberaceae	4	3 %	7	4 %
Cucurbitaceae	5	4 %	5	3 %
Musaceae	1	1 %	5	3 %
Piperaceae	2	2 %	5	3 %
Acanthaceae	4	3 %	4	3 %
Arecaceae	4	3 %	4	3 %
Malvaceae	3	2 %	4	3 %
Myrtaceae	3	2 %	4	3 %
Meliaceae	3	2 %	3	2 %
Moraceae	2	2 %	3	2 %
Oxalidaceae	2	2 %	3	2 %
Alliaceae	2	2 %	2	1 %
Apiaceae	2	2 %	2	1 %
Apocynaceae	2	2 %	2	1 %
Rubiaceae	2	2 %	2	1 %
Anacardiaceae	2	2 %	2	1 %
Clusiaceae	1	2 %	2	1 %
Crassulaceae	1	2 %	2	1 %
Lauraceae	1	2 %	2	1 %
Menispermaceae	1	2 %	2	1 %
Sapindaceae	1	2 %	2	1 %
Acoraceae	1	1 %	1	1 %
Aloaceae	1	1 %	1	1 %
Amaranthaceae	1	1 %	1	1 %
Annonaceae	1	1 %	1	1 %
Araceae	1	1 %	1	1 %
Balsaminaceae	1	1 %	1	1 %
Basellaceae	1	1 %	1	1 %
Bombacaceae	1	1 %	1	1 %
Brassicaceae	1	1 %	1	1 %
Bromeliaceae	1	1 %	1	1 %
Campanulaceae	1	1 %	1	1 %
Caricaceae	1	1 %	1	1 %
Cecropiaceae	1	1 %	1	1 %
Convolvulaceae	1	1 %	1	1 %
Costaceae	1	1 %	1	1 %
Cyperaceae	1	1 %	1	1 %
Gleicheniaceae	1	1 %	1	1 %
Leeaceae	1	1 %	1	1 %
Loranthaceae	1	1 %	1	1 %
Lythraceae	1	1 %	1	1 %
Melastomataceae	1	1 %	1	1 %
Myristicaceae	1	1 %	1	1 %
Sapotaceae	1	1 %	1	1 %
Simaroubaceae	1	1 %	1	1 %
Sterculiaceae	1	1 %	1	1 %
Theaceae	1	1 %	1	1 %
	<b>124</b>	<b>100 %</b>	<b>158</b>	<b>100 %</b>

\*The percentages obtained by dividing the number of genera/species in the certain family with total number of genera/species

Other 36 plant families that are being used by Minangkabau ethnic but limited to one or two species. One of them is Rubiaceae. Two species from Rubiaceae that have been used are *gambia* (*Uncaria gambir* (W. Hunter) Roxb.) and *mengkudu* (*Morinda citrifolia* L.). Local people used *U. gambir* leaves to relieve influenza, diarrhea,



**FIGURE 1.** The type of disease that cured by using medicinal plants in *nagari* Guguak Sarai, Sumatera Barat.

toothache and hemorrhoids. This is related to the ethanol extracts and catechins from the leaves of *U. gambir* that have antioxidants and antibacterial characteristic [29-31]. Besides that, *U. gambir* is also a species with high economic value commodities from West Sumatera [32]. Utilization of *U. gambir* as medicinal plants is also carried out by sub-ethnic Batak Simalungun and Karo [33-35].

Based on the classification of the disease, the species that used by Minangkabau ethnic are grouped into 52 categories, but generally, it can be divided into healing and disease prevention. The healing process can be done by themselves or with help of a shaman. Some shamans diagnose diseases through media such as chicken (*Gallus gallus* L). The technique is called *manyilau* in the local language [36]. Shaman gives treatment such as *bauruik* (massaging), *manto/mitera* (spelling), and *maureh* (applying herb). In the small case, shaman just give the information of medicinal plants, then the patients should seek the plants themselves.

Most of medicinal plants are used in the treatment of the gastrointestinal disorder (37 species) (Fig. 1). Several gastrointestinal disorders are recognized by local people, for example, *balapa paruik* (symptoms such as magh), *dek gaca/bocor* (diarrhea) and constipation. Species that are used to cure the gastrointestinal diseases such as *jambu lipo* (*Psidium guajava* L.), *gambia* (*U. gambir* (W. Hunter) Roxb.), *saus* (*Manilkara zapota* (L.) Royen), *sicerek* (*Clausena excavata* Burm.f.), and *sampelo* (*Carica papaya* L.). In order to treat *dek gaca/bocor* (diarrhea), local people use decoction *aie jambu lipo sabatang* that come from all the parts of *P. guajava*. In fact, extracts from the leaves, barks, flowers and fruits of *P. guajava* have an anti microorganism that can stop diarrhea [37]. The use of *P. guajava* in diarrhea medication also found at Baka-Pygmyes in Dja, Cameroon [37]; Muna tribe, South East Sulawesi [38] and Douala [39].

## CONCLUSIONS

Minangkabau ethnic in *nagari* Guguak Sarai use a total 158 medicinal plants (124 genera; 54 families) in against 52 diseases. Among the diseases, gastrointestinal disorders had the highest number of medicinal plants to be used (37 species), skin diseases (36 species), postpartum cures (29 species), urinary tract disorders (26 species) and rheumatism (19 species). Fabaceae (Leguminosae), Euphorbiaceae, Poaceae, Lamiaceae, and Asteraceae were the five dominant families of medicinal plants utilized by local people.

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