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Ethnobotanical Study of Edible Ferns Used in Bali Indonesia

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Abstract—With very few exception ferns have not been widely used as sources of food and medicine. An ethnobotanical study was conducted to investigate Balinese ethnobotanical knowledge of edible ferns. We interviewed fifty informants of different age, sex, and villages to obtain information on traditional knowledge of edible ferns. Investigations were made by interrogating village leaders, religious leaders, farmers, and elderly people. The study has resulted in the documentation of 4 edible fern species. These species were distributed across 3 families and 3 genera. *Woodsiaceae* was the dominant family (2 species, *Diplazium esculentum* (Retz.) Swartz and *Diplazium repandum* Bl.), followed by Blechnaceae (*Blechnum orientale* L.) and Thelypteridaceae (*Pneumatopteris callosa* (Blume) Nakai.). All species were green vegetables. *Pneumatopteris callosa* is also used for treatment of various ailments like fever and hypertension. Documentation of these species may provide basic information for conservation, possibly further exploitation, and will preserve local traditional knowledge.

***Keywords*— ethnobotany, traditional knowledge, edible ferns, pteridophytes, Bali.**

INTRODUCTION

Ethno botanical studies have attracted a number of scholars in recent years and they have supplied a lot of information about different uses of plants. All over the world, there has been an increasing interest in the scientific study of man-plant interaction in the natural environment which is clearly visible among various indigenous people. Today, ethnobotany has become an important and crucial area of research and development in resource management, conservation of biodiversity at genetic, species and ecosystem levels, and socio-economic development of the region (Martin, 1995; Cunningham, 2001; Srivastava, 2007; Caneva et al., 2013).

Man has been using plants as a source of food, medicines and many other necessities of life since ancient times. Even to this day the native villages that exist depend on the plant life in their surroundings. Though there were investigations of the edible economic values of the higher plants, especially the pteridophytes and angiosperms have been unfortunately ignored (Mannan et al., 2008). The pteridophytes considered to be the primitive vascular plant group which are scattered all over the world. Although, not much consideration has been given towards the utility of pteridophytes yet, these posses are equal economic importance including food and medicine (Mannan et al., 2008). More than 12,000 species of fern and fern allies have been reported (Chapman, 2009). Ferns are found to provide food, medicine, fiber, crafts and building materials, abrasives and of course decoration (Sen and Ghosh, 2011).

Bali is blessed with rich and diverse heritage of cultural traditions. These traditions are associated with the use of plants (Agung, 2005; Badan Pusat Statistik, 2013). There is one report on edible ferns found in Bali (Astuti et al., 2000). Though ethnobotanical studies have reported the food and medicinal values of many species of pteridophytes, still some species of pteridophytes used by native villages in Bali Indonesia are yet to be documented for their applicative potential. In this study an attempt has been made to compile local knowledge on various edible ferns of Bali.

MATERIALS AND METHODS

We carried out thirteen ethno botanical fieldworks from May to July 2013. We conducted semi-structured interviews to obtain information on local knowledge and practices regarding food and medicinal uses of edible ferns (Alexiades and Sheldon, 1996). We used a sampling strategy to select informants of different age and sex, from thirteen native villages. We used snowball sampling to contact hard-to-find key informants such as village leaders, religious leaders, farmers, and elderly people (Bernard, 2002). Our final sample included fifty informants from thirteen native villages (Figure 1). These villages ranged between 242 to 1187 m above sea level, and 45 - 80 km away from the Capital City of Bali Island (mean value ± SD: 67.15±16.48). Distance to the nearest village ranged between 1 to 5 km. The sample included men (90%) and women (10%) between 14 and 78 years of age (mean value ± SD: 56.34±13.84).

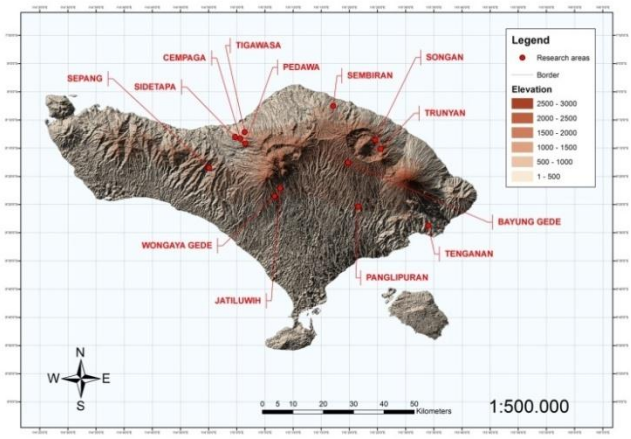

Fig. 1 Location map of the study area

RESULTS AND DISCUSSIONS

Ethnobotanical edible ferns belong to 3 families and 3 genera, considered into wild species. Two species are Woodsiaceae, followed by Blechnaceae (1), and Thelypteridaceae (1). The genera are *Diplazium* (2), *Blechnum* (1), and *Pneumatopteris* (1). The life forms are shrubs (3), and herb (1). The most frequently used part is leaves (Table 1). Most plants are collected throughout the year. With the present information, it is clear that in hills and forests where majority of ferns grow, local people frequently use their leaves as source of food and leaves decoction as medicine for various ailments.

Fig. 2 *Blechnum orientale*

Fig. 3 *Pneumatopteris callosa*

Fig. 4 *Diplazium esculentum*

Fig. 5 *Diplazium repandum*

Two ferns investigated have been previously reported to posses' food uses. *Blechnum orientale* and *Diplazium esculentum* are widely used as green vegetables and sold in the traditional markets (Kunkel, 1984). *Pneumatopteris callosa* and *Diplazium repandum* are not reported in Kunkel' check list on edible plants of the world (Kunkel, 1984), and these species could be object of further investigations. Fever and hypertension are the major ailments, where *Pneumatopteris callosa* is used.

Table 1. Edible ferns used by local people in Bali, Indonesia

Family, scientific name, life form	Vernacular name	Parts used, uses	N. Inf	N. Villages
Blechnaceae				
Blechnum orientale L., herb	Paku jahe	Cooked leaves added to vegetable soups	2	1
Thelypteridaceae				
Pneumatopteris callosa (Blume) Nakai, shrub	Paku lindung	Cooked leaves added to vegetable soups	3	3
		Leaf decoction used for fever, and hypertension	3	3
Woodsiaceae				
Diplazium esculentum (Retz.) Swartz, shrub	Paku jukut, paku kedis	Cooked young leaves added to vegetable soups	28	9
Diplazium repandum Bl., shrub	Paku udang, paku labuh	Cooked young leaves added to vegetable soups	6	2

As in thirteen native villages, in Bali, *Blechnum orientale*, *Pneumatopteris callosa*, *Diplazium esculentum*, and *Diplazium repandum* have been traditionally employed for green vegetables (60% of the informants mentioned this use-category). Moreover, 6% of informants reported the medicinal use of *Pneumatopteris callosa*. Informants (40%) reported that they had only passive knowledge about edible ferns, i.e. they knew about ferns, but had never consumed, or collected. The category of 'passive knowledge holder' included male and female informants from three different native villages.

Bali is one of the floristically richest provinces in Indonesia, and provides an excellent piece of rich biodiversity. Flora of Bali is characterized by 1595 species of Spermatophyta, 173 species of Pteridophyta, and 169 species of Bryophyta (Girmansyah et al., 2013). The native village is solely depending on the forest products for their food. They have their own herbal health care system. Unfortunately, the species diversity has also been affected due to the changing pattern of use of resources. Results from this study revealed that traditional knowledge on edible ferns is very low, it could be seen that only 4 edible ferns obtained. In some native villages, the traditional knowledge has become threatened, and there was none to carry the knowledge to the next generations. Now a days, the village folks depends more on the modern system of medication. If not documented properly, the knowledge shall be lost forever without any means retrieval (Sen and Ghosh, 2011). So there is an urgent need for the conservation of traditional ethno botanical knowledge which is important for sustainable biological and cultural diversity.

CONCLUSIONS

It is concluded that ethno botanical importance of edible ferns and their nutritional constituents would be helpful in providing local people with various elements of essential nutrients. In addition to this, a number of fern is used as medicine.

Our analyses revealed an impact of tourism, modernization and globalization on Balinese ethno botanical knowledge. It could be seen that only 4 edible ferns obtained, this result is very far, compared to 173 species of Pteridophyta as reported in check list on Flora of Bali.

NOMENCLATURE

N. Inf number of informants
N. Villages number of villages

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