PROS SEM NAS MASY BIODIV INDON
Volume 3, Nomor 1, Februari 2017 ISSN: 2407-8050
Halaman: 56-61 DOI: 10.13057/psnmbi/m030110

Useful plants from Wolomeze Protected Forest, Ngada District , Florest, East Nusa Tenggara

R. SYAMSUL HIDAYAT♥, RIA CAHYANINGSIH
Center for Plant Conservation -Botanic Gardens, Indonesian Institute of Sciences. Jl. Ir. H. Juanda No.13. PO BOX 309 Bogor 16003, Indonesia. Phone: +62 251-8322187/8321657 Fax: +62 251-8322187, ♥email: hidayatkbri@yahoo.com.

Manuskrip diterima: 12 April 2016. Revisi disetujui: 31 Januari 2017.

Abstrak. *Hidayat RS, Cahyaningsih R. 2017. Tumbuhan berguna dari Hutan Lindung Wolomeze, Ngada, Nusa Tenggara Timur. Pros Sem Nas Masy Biodiv Indon 7: 56-61.* Hutan Lindung Wolomeze adalah hutan tropis tersisa dan terawat di Desa Nginamanu, Kecamatan Wolomeze, Kabupaten Ngada, di Pulau Flores, Indonesia. Suku Ture, salah satu suku terbesar di daerah ini, memiliki hubungan yang kuat dengan hutan ini. Mereka mencari dan memperoleh bahan bangunan, beberapa makanan alternatif, dan obat-obatan alami dari hutan tersebut. Penelitian ini bertujuan untuk mendapatkan informasi tumbuhan berguna yang tumbuh di hutan lindung dan untuk memastikan kegunaannya. Penelitian dilakukan di daerah hutan berketinggian 400-600 m di atas permukaan laut yang sering dikunjungi masyarakat. Pengumpulan data dilakukan melalui survei lapangan dan wawancara terhadap informan kunci yaitu sesepuh setempat. Diperoleh 40 spesies tumbuhan yang dapat digunakan sebagai tanaman obat, sumber makanan, bahan bangunan, dan untuk tujuan lain. Meskipun kearifan lokal dan sikap menghormati alam telah ada dalam tradisi masyarakat setempat serta mendukung kelestarian hutan, namun tekanan akibat dari meningkatnya kebutuhan manusia akan merusak dan mengurangi keutuhan hutan tersebut. Dengan demikian, upaya serius oleh berbagai pemangku kepentingan diperlukan untuk menjaga kelestarian hutan.

Kata kunci: Flores, inventarisasi tumbuhan berguna, hutan tersisa, Wolomeze

Abstract. *Hidayat RS, Cahyaningsih R. 2017. Useful plants from Wolomeze Protected Forest, Ngada, East Nusa Tenggara. Pros Sem Nas Masy Biodiv Indon 7: 56-61.* Wolomeze protected forest is a well maintained tropical forest in Nginamanu Village, Wolomeze Subdistrict, Ngada District, on the island of Flores in Indonesia. The Ture people, one of the largest tribes in this area, have a strong connection with the forest. They seek and obtain building materials, some alternative food, and natural medicine from the forest. Our research aimed to compile an inventory of the useful plants growing in the protected forest and to ascertain their particular uses. A survey was carried out in an area of forest 400-600 m above sea level that the people frequently visit. The empirical observations of the field survey were supplemented by key informant interviews with local elders. A list was obtained from 40 plant species that can be used as medicinal plants, food sources, building materials, and for other purposes. Despite the folk wisdom and respect for nature that exists in the local traditions of the community keep the forest healthy, the pressure of increasing human needs will damage and diminish it. Thus, the serious effort by various stakeholders is needed to be applied to the on-going maintenance of the forest's integrity.

Keywords: Flores, inventory of useful plants, random survey, remnant forest, Wolomeze

INTRODUCTION

Wolomeze Protected Forest is one of the remaining forests in Ngada District, Flores, located in Nginamanu Village, Wolomeze sub-district. The area of the forest is 3237.5 ha, representing only 3.5% of the total forest area of Ngada District and the human population of Wolomeze is small, about 4,998 inhabitants, or 3.62% of the total population of the District (BPS Ngada, 2010). However, the people have a close connection with the forest, and even though the forest is quite far from the residential areas of the sub-district, this does not necessarily ensure that the forest is preserved intact, because the community has a strong dependence on the natural resources provided by the forest.

The nearest inhabited area to the forest is Nginamanu Village, consisting of four hamlets, namely Tejo, Nangge-kurubhoko, Malafai and Ije. Kurubhoko, at a distance of 6 km from Wolomeze sub-district center, is regarded as the Nginamanu Village center. Nginamanu has a total population of 1,846 people or 395 families. Almost all earn their livelihood from farming. However, many of the people also seek forest products to supplement their family income, as well as to supply daily needs. Some people use particular forest products for medicines, building materials, and alternative foods.

According to a report of the regent of Ngada (Jakcobus 2012), the contribution that is made by the forest sector in the local economy is fairly limited, amounting to only 1.4% of total revenue. The added value given to the forest products is also very small. This is because of the limited production and lack of large scale cultivation of traded forest products.

The study reported here aimed to collect information about the forest products utilized by the people of Nginamanu Village, especially about forest plants. Since effect of people activity in forest on in lost of local

knowledge and destruction of natural resources. It is important to do this study like the study has done to Wawonii tribe in Southeast Sulawesi (Rahayu et al., 2006), Sunda tribe at Sukabumi in West Java (Rahayu et al., 2012), and Sakai tribe in Riau (Wulandari et al. 2014). It is expected that the study will contribute to finding sustainable development pathways for the utilization of forest plants that will benefit the people and preserve the forest.

MATERIALS AND METHODS

The study was conducted at Nginamanu Village and the Wolomeze forest area, in Ngada District, East Nusa Tenggara province (Figure 1). The research was conducted in forest areas up to 600 m above sea level, considering the fact that the peoples' interaction with the forest is mainly confined to this area and that local custom forbids entry to certain areas in the forest above this altitude.

Interviews with key local people, particularly the village elders, were carried out in order to obtain accurate information about local plant usage in the Wolomeze forest. The information consisted of the local names of the forest plants (in the Nginamanu language) and the uses made of them. Furthermore, direct observation of plants utilized in the forest area was carried out with the assistance of two experienced local informants, namely Nginamanu Villagers Cosmas and Joseph. Once the plants were discovered in the field, they were identified, and given their scientific name (Latin name); and their presence was noted in a field book. The scientific name of each plant was verified in accordance with The Plant List (2016).

RESULTS AND DISCUSSION

"Flores" comes from the Portuguese word meaning "flower". This island is located in East Nusa Tenggara Province (NTT), Indonesia. Flores, with a land area of approximately 14,300 km^2, is included in the group of small Sunda Islands along with Bali and West Nusa Tenggara province (NTB). The forests of Flores island still retain interesting and unique flora, but the available data is limited, especially with regard to diversity of plant species in the lowlands. Moreover, the conversion of land to new uses with accompanying degradation of lowland rain forest continues unabated.

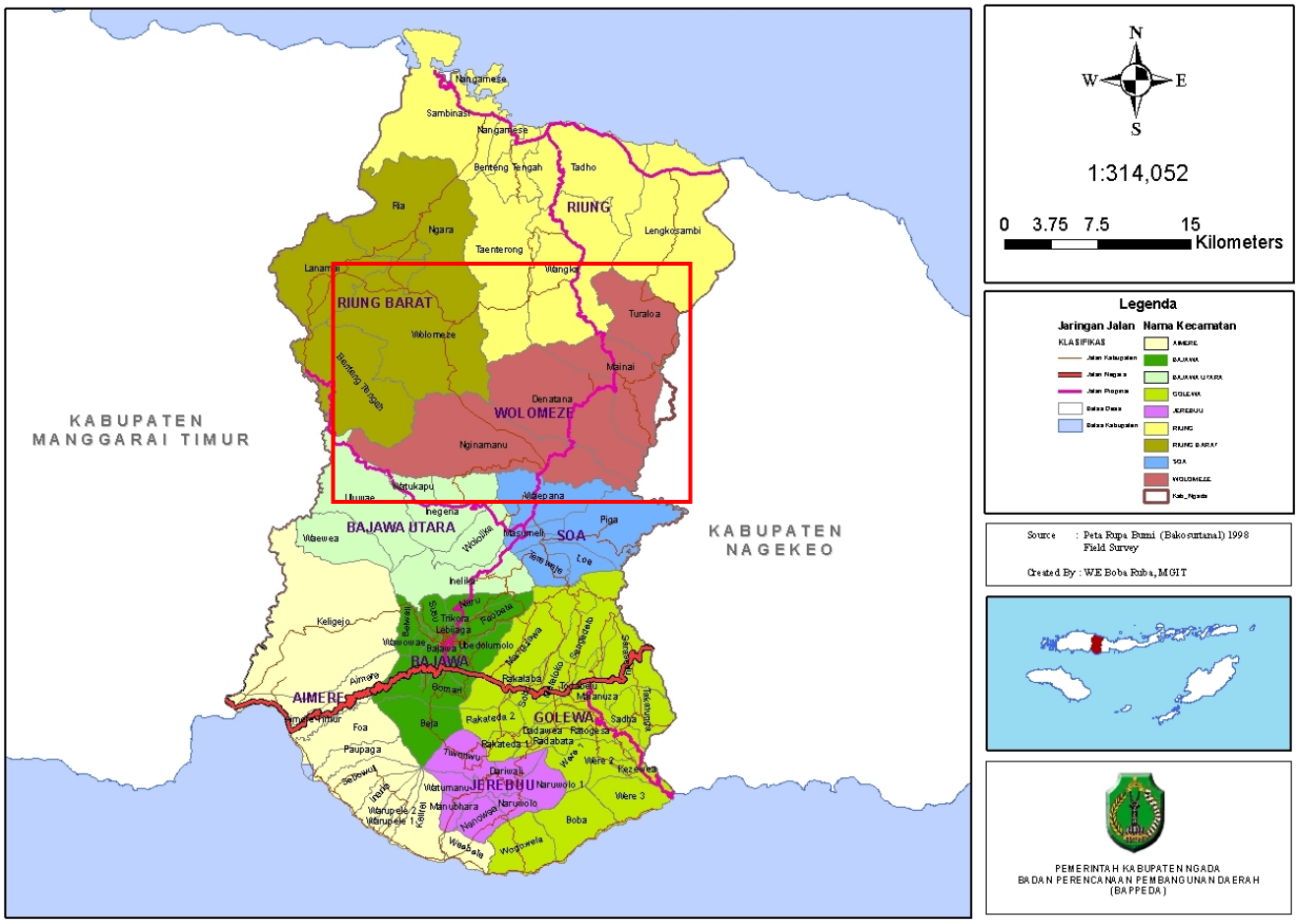

Figure 1. Research site at Wolomeze Protected Forest, Nginamanu Village, Ngada District, on the island of Flores, East Nusa Tenggara (source: http://www.ngadakab.go.id/peta-kabupaten-ngada)

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One of the remaining lowland forest areas on Flores island is Wolomeze Protected Forest in Ngada District. Wolomeze in Nginamanu language used by Ture tribe, means a big mountain (Wolo = mountain, meze = large). The Ture tribe is the largest tribe in Nginamanu Village among other tribes, such as Denge, Zeru, Koto, Pote, Mbamba, Pelu and Tibu.

Some high economic value trees planted in the area of the village before the Forest entrance, include cashew (*Anacardium ocidentale*), mango (*Mangifera indica*), candlenut (*Aleurites moluccana*) and tamarind (*Tamarindus indica).* In the Wolomeze area, dry candlenut is sold for a prices of at least 15,000 Rp. per kg. The people can provide up to 100 kg of candlenut in 2-3 days. The process of stripping off its shell is done manually in their spare time from farming or farm laboring. The potential production in Wolomeze is recorded to be as high as 12 tons obtained from 132 ha planted (BPS Ngada. 2010). Candlenut dominates much of the green area of Flores island. The silvery leaf surfaces of the candlenut trees in Flores create a distinctive visual landscape when viewed from the air or from a distance.

Cashew collectors buys wet cashew from Flores, East Nusa Tenggara at a price of Rp 15,000 per kg. They send it to Surabaya. As a result, East Nusa Tenggara is one of the cashew production centers for Indonesia. According to Listyati and Sudjarmoko (2011), the development of cashew in Flores could become a model for other cashew centers. However the low productivity and quality of cashews are major problems in cashew planting in Indonesia, including Flores. The existing plantings, with minimal maintenance carried out by Welomeze people in Wolomeze, supports Listyati and Sudjarmoko's statement (2011) that the way Indonesian farmers cultivate cashew planting is not as good as the way Indian or Vietnamese farmers cultivate it.

Tamarind (*Tamarindus indica*) adorns many areas in Flores island, especially along Bajawa to Riung road and also in several locations around Wolomeze. Many of them seem old and sturdy tree. It appears that the abundant fresh tamarind fruit receives less attention from entrepreneurs and local merchants than it potentially might. It is reported that some is harvested by the community to be sold on local markets or shipped to Surabaya. In Larantuka in Eastern Flores, tamarind is planted as a roadside tree and particularly in the dry season its edible seed along with coconut is boiled or deep fried for consumption (Wawo, 1998).

In addition to candlenut, cashew, and tamarind, some people also have coffee, cocoa and vanilla plantations. Mango is usually for self consumption or for sale in traditional markets. The people of Nginamanu have a fairly simple life, far away from city modernization. The forest is an alternative income source and also meets some of life's everyday needs (Table 1). In treating illnesses and disease, for example, the people are reliant on natural resources. Some forest plants are known to have been used by the people as source of traditional medicines and natural remedy. Other kinds of forest plants are used for household needs (Table 1).

Iswandono (2015) reported that most tribal communities in Flores have knowledge about medicinal plants from the forests, while indigenous medical practitioners are often considered to have magical power. Medicinal plant use from the forest satisfies a special need, because the people have a belief that forest plants are more beneficial to health than garden plants. Some forest plants are used in natural remedies such as 'mengkudu hutan' (*Morinda citrifolia* L., locally called 'klembah' or 'kemboh'), 'mindi', and 'wangkatere' (*Zanthoxylum rhetsa* DC [unresolved]). Most people in Nginamanu use 'klembah' as a cure for lumbago, by boiling the fruit and drinking the boiled water.

In the area at an altitude of 400-600 m above sea level, the Wolomeze forest is dominated by bamboo populations. There are at least three bamboo species; they are 'ngguru' (*Bambusa vulgaris*), 'betoh' (*Dendrocalamus asper*), and 'pri' (*Gigantochloa atter*). These bamboos are commonly found in small Sunda Islands, like Sumba island (Widjaja and Karsono, 2005). However, only two types of bamboo are used for building materials that is 'betoh' and 'pri', while 'ngguru' is used for fences. The general categories of use for plants from the Wolomeze forest are listed in Table 2.

From Table 2, it can be seen that the most broadly used category of forest plants is for medicinal purposes. This result is similar to what Rahayu et al. (2012) found. The second largest category is plants used for foods and beverages. This is consistent with the findings of the ethnobotanical survey of Iswandono (2015) in the Ruteng forest of Flores. Iswandono found that the largest group of useful forest plants consisted of medicinal plants, followed by plants used for food. In our study of the Wolomeze forest, Malaria and fever are the main diseases for which forest medicinal plant are used (7 species), followed by lumbago and stomach ache (2 and 3 species, respectively) and diabetes, diarrhea, headache, cold, cancer, wound, red eyes, and breath shortness (1 species respectively). That the main use is for malaria seems very reasonable considering that the Ngada District is designated a malaria endemic area (Pos Kupang, 2016) and that the highest malaria stratification in Indonesia is in East Nusa Tenggara (Hasyimi et al. 2013). Plant use for curing fever or malaria is also common in other areas such as on Wawonii island in the Banda Sea (Rahayu et al., 2006) and Minahasa in North Sulawesi (Mamahani et al., 2016). In addition to *Andrographis paniculata* and *Tinospora crispa* that is used for malaria cure, the people in Sei Kepayang, Asahan of North Sumatera is also used *Blumea balsamifera* stated for fever cure in Welomeze (Abdillah et al, 2014).

The most used plant part is leaves (Table 3). Apart from chlorophyll, many leaves contain various essential oils that are useful for health. In addition, according to Rusmina et al. (2015), leaves during photosynthesis and development accumulate various other organic compounds that may have curative properties. Therefore, it has been found in studies in many localities (Dahlan 2011, Wulandari et al. 2014, Setiawan and Qiptiyah 2014, Ramdhan 2015, and Rusmina et al. 2015) that leaves are the plant part most used in traditional medicine.

Table 1. List of Useful Plants in Wolomeze Forest

Local Name	Scientific name (The Plant List, 2016)	Uses
Wurakogha	*Sida rhombifolia* L.	A cure for stroke: root, boiled with a glass of water. Drunk in the morning and afternoon.
Rasumori	*Tinospora crispa* (L.) Hook. f. & Thomson	A cure for malaria: Stem boiled with a glass of water. Drunk every morning before a meal
Messi	*Erythrina fusca* Lour.	A cure for fever: the bark is boiled in water. Drunk
Kemboh	*Morinda citrifolia* L.	A cure for lumbago: fruit is boiled in water. Drunk
Sepah	*Caesalpinia sappan* L.	Healthy tea: The bark is boiled in water. Drunk
Kewoh	*Ficus hispida* L.f	Fruit consumed
Mpak	*Melicope latifolia* (DC.) T.G. Hartley	Leaf for pesticide
Ngguru	*Bambusa vulgaris* Schrad.	Fences
Betoh /bambu betung	*Dendrocalamus asper* (Schult.) Backer	Building material
Pri	*Gigantochloa atter* (Hassk.) Kurz	Building material
Mopo	*Gardenia tubifera* Wall. ex Roxb.	Sap from shoot used as a glue
Lareng	*Derris elliptica* (Wall.) Benth.	Root used as fish poison
Denge	*Kleinhovia hospita* L.	A cure for stomach ache: seven leaves boiled. Drunk; can be taken 3 times
Wangkatere	*Zanthoxylum rhetsa* DC (unresolved)	A cure for renal, diabetes, and diarrhea: The bark from as much as 7 trees is boiled with 7 bucket of water
Mukutea	*Blumea balsamifera* (L.) DC.	A cure for fever: leaf and stem boiled. The water is used for a bath or is drunk
Serei merah	*Cymbopogon sp.*	A cure for stiffness (tired after work): root and leaves boiled. The water is used for a bath
Kasizarah	*Mentha arvensis* L.	A cure for several illnesses: a whole plant boiled and used in a shower
Hoboana	*Centella asiatica* (L.) Urb.	A cure for red eyes: leaves squeezed and patched to the wound, or extracted and the liquid dropped into the eyes
Cinta boa	*Strobilanthes crispa* (Blume/ T. Anderson) (unresolved)	A cure for lumbago: a whole plant is boiled and drunk
Manulalu	*Azadirachta indica* A. Juss.	A cure for malaria: a whole plant is boiled and used in a shower
Temulawak	*Curcuma zanthorrhiza* Roxb.	A cure for breath shortness: tuber scraped, extracted, and drunk
Learengga	*Zingiber zerumbet* (L.) Roscoe ex Sm.	A cure for headache: tuber scraped, extracted, and drunk
Kune	*Curcuma longa* L.	A cure for a cold: tuber extracted and its extract is drunk
Sirih hutan	*Piper sp.*	A cure for after birth mother: a whole plant is boiled and used in shower
Sewang	*Litsea glutinosa* (Lour.) C.B.Rob.	A cure for breast cancer: Leaves crushed and patched on the breast or boiled in water and drum
Kingga	*Emilia coccinea* (Sims) G. Don.	Tonic: Leaves boiled and eaten
Turazera	*Hyptis capitata* Jacq.	A cure for wounds: fruit is crushed and patched on wounded skin
Cocor bebek	*Bryophyllum pinnatum* (Lam.) Oken	A cure for fever: leaves are crushed and patched on the body
Moro mboro	*Portulaca oleracea* L.	A cure for stomach ache: a whole plant is boiled and eaten
Bidara	*Ziziphus jujuba* Mill.	Fruit is consumed
Sambiloto	*Andrographis paniculata* (Burm.f.) Nees	A cure for malaria: a whole plant is boiled
Boto	*Tabernaemontana sphaerocarpa* Bl.	A cure for malaria: the bark is boiled with a glass of water. The water is drunk.
Milos	*Begonia coriacea* Hassk.	Its stalk is eaten as a vegetable.
Akar lareng	*Merremia sp.*	The root is used as a fish poison
Mangga hutan	*Mangifera indica* L.	Fruit is consumed
Kelo	*Ficus variegata* Blume	Fruit is consumed
Labe	*Ficus fistulosa* Reinw. ex Blume	Vegetable, fruit
Tuak	*Arenga pinnata* (Wurmb) Merr.	Sugary beverage
Garit	*Canarium hirsutum* Willd.	Resin for balsam or Perfume
Ngancar	*Planchonia valid* (Blume) Blume	A cure for stomach ache: a handful of bark and leaves are boiled with 3 liters of water, then one liter is left to be drum

Table 2. The categories of useful plants from the Wolomeze forest

Uses	Number of spesies
Medicine	24
Food/drink	9
Building material	2
Fish poison	2
Others	4

Table 3. Plant parts used for medicine in Wolomeze forest

Plant part used (*local name*)	Number of species
Rhizome/root (*kabu*)	4
Stem (*nekah*)	1
Bark (*kuki*)	3
Leave (*wunu*)	7
Fruit (*wuah*)	2
Whole plant (*rohpu*)	6

Apart from the useful plants identified in this study in Wolomeze forest, there are many other interesting plants that are utilized in this region of Flores. For example, species such as *Fraxinus griffithii, Dysoxylum gaudichaudianum, Aphanamixis polystachya, Canarium hirsutum, Garuga floribunda* and *Palaquium amboinense* provide wood useful as a building material, or medicines (Iswandono 2015).

A special component of the flora in East Nusa Tenggara is the species *Santalum album* internationally famous as a producer of sandalwood. It is believed that sandalwood (*Santalum album*) was formerly part of the plant community in the Wolomeze forest, but it is now difficult to find. The area of distribution for sandalwood in East Nusa Tenggara is principally located in Flores, Solor, Alor, Pantar, Lomblen, Sumba, Rote, Timor and Wetar island. According to BAPPENAS (2003), the distribution area of sandalwood is narrowing. In addition, IUCN (2016) includes sandalwood in the vulnerable or susceptible category of plant species.

Sandalwood is commonly used for its fragrance, in such things as perfumes and aromatherapy. According to Suseno (2001), the active cultivation of sandalwood began over 100 years ago and is now supported by research. The knowledge to grow good sandalwood exists but until now there have been no sandalwood plantations on a wide scale. Raharjo (2013) has suggested that the reason for the lack of extensive sandalwood plantations is because public support for and participation in the development of sandalwood plantations was undermined by experience of detrimental policy approaches to the management of sandalwood in the past. Nevertheless, a French volunter anthropologist, Nao Remon, who resides in Nginamanu Village reports that a group of people in the village is trying to re-grow sandalwood in the forest.

Despite the fact that the people's dependence on the forest is strong, nevertheless, local policy towards sustainability of the forest is upheld. Forests for the people are divided into two areas - namely, indigenous forest, and protected areas - which are separated by boundary markers. Any theft or harvesting of forest products without local permission, in either the indigenous forests or the protected areas, will result in the offender receiving penalties from the people of Wolomeze. The penalty imposed is that the offender is required to slaughter pigs to feed all the people in the village. Similar sanctions are also imposed by Sambinase villagers in Manggarai district where many Muslims live, except that in this case it is cattle that must be slaughtered. Actually, this kind of customary policy applies locally in most parts of Flores. Forests are considered sacred places, which are also sources of livelihood. Especially important are springs, water sources, that are often located in these forests. These are always protected by customary law (Iswandono. 2007).

In conclusion, Flores is an island that still holds many biological mysteries, part of the rich natural heritage of eastern Indonesia. Its mountainous and hilly area create a particular challenge for regional managers seeking to maintain the precious forests amidst the growing public need for settlements and plantation livelihoods. One of the forest area that still remains in good condition and is not far from the local people's residences is Wolomeze Forest. The healthy condition of this forest is due to the folk wisdom and respect for nature that exists in the local traditions of the community. Even so, the natural resources of the forest will gradually diminish and disappear under the pressure of increasing human needs, unless serious effort by various stakeholders is applied to the on-going maintenance of the forest's integrity.

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