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2017



The 1st SATREPS Conference, Bogor Nov 14th, 2016

"The Project for Producing Biomass Energy and Material through Revegetation of Alang-alang (*Imperata cylindrica*) Fields"

Utilization of Alang-Alang (*Imperata cylindrica* (L.) Raeusch.) as Traditional Medicine in Indonesian Archipelago

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Abstract

Alang-alang is often considered as a weed to be destroyed on farms or plantations. However, the fact that alang-alang have important role in the field of health. Articles that explore the benefits of alang-alang have been written, especially in the popular media, but a source of information and user community often unclear. Ethnobotany studies to various regions in Indonesia have been conducted by teams of Bogor Botanical Gardens since 1995. Some information about the use of medicinal plants have been recorded through direct interviews in various areas, one of which is the use of alang-alang.. This paper presents various alang-alang utilization either singly or as a mixture, to cope with various diseases. This information is a summary of the various ethnobotany studies conducted by team of Bogor Botanical Garden, and supported by some of the relevant literature. This information is very important for health in the present and future.

Keywords: ethnobotany, alang-alang, traditional medicine

1. Introduction

Traditional medicine is an integral part in the life of the Indonesian people. In many areas, before being used in herbal practice most of these plants are considered as useless plant. One of these plants is alang-alang or blady grass. Alang-alang (*Imperata cylindrica* (L.) Beauv) is a chronic grass plant spread almost all over the hemisphere and is considered a weed in farmland. In the region of Southeast Asia can be found about 35 million ha overgrown by grass, and about 8.5 million ha spread in Indonesia [1]. This condition is often difficult for farmers and there is no other way except to get rid of it in various ways.

Behind the losses caused by weeds on agriculture, it turns out this plant also has many benefits, among others as material for paper, plaiting materials, even as the roof of a traditional house such as in Papua and some areas of eastern [2]. Utilization of alang-alang is quite important in the field of health, syrups and beverages even been produced by several companies engaged in the field of health or herbal. Many observers of traditional medicine and herbs observers have revealed the benefits of this plant in various media. Nevertheless, the writings that exist both in print and electronic media often do not explain in detail how to use alang-alang and who ever did treatment with this plant.

This paper presents the results of a survey to some areas, the fact that one of the wild plants are often used as traditional medicine is alang-alang. Judging from the chemical content, alang-alang contain 40.22% α -cellulose, 59.62% holoselulosa,

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18.40% hemicellulose (pentosan), and 31.29% lignin [1]. Thus, it can be said that this weed is a potential for health. The purpose of this paper is to disclose information to the public that the alang-alang are widely used by most of the people of Indonesia and became one of the assets flora that is important in the field of medicine. Thus alang-alang should not necessarily be destroyed but should begin to consider aspects of the conservation and utilization in the future.

2. Methods

The ethnobotany data have been obtained from 14 location surveys (Fig. 1) conducted by teams of Bogor Botanical Gardens since 1995, where the author was involved in it. Method used in this research is purposive sampling based on literature and expedition report. The data have been collected in a single document. Then, specific information regarding the use of alang-alang as traditional medicine recorded from all existing documents. Furthermore, in comparison to this information, has also been carried out surveying the literature on ethnobotany study conducted by researchers in the other party or another institution. Literature sought as far as possible the results from the various islands that can represent the existence of a large island in Indonesia. Based on information obtained from literature outside institution and expedition report comes from the institution itself, then drafted tables on the use of alang-alang as a natural medicine in Indonesia.

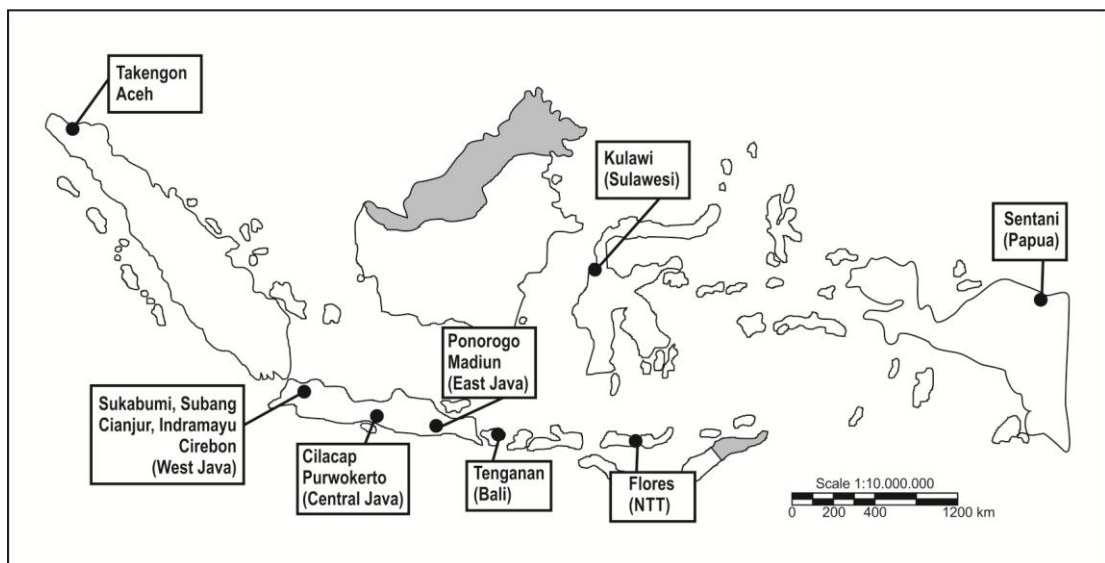


Figure 1. Location surveys of alang-alang in Indonesia

3. Result and Discussion

Alang-alang (*Imperata cylindrica* (L.) Beauv is a serious weed not only in crops but also in natural areas, and it is native to China, Japan, Philippines, Southeast Asia, and Australia [3]. *I. cylindrica* is a perennial helophyte grass which varies in height (30-150 cm). The culms (above-ground stems) are short, but a highly developed and branched rhizome. The rhizomes are tough, white, and the rhizomatous system can reach depths of more than 50 cm [4] and represents at least 60% of the total plant biomass [5]. The leaves are stiff, linear-lanceolate, up to 40-90 cm long and 2 cm wide, growing grouped at the nodes of the rhizome. The inflorescence is a white, spike-like panicle, terminal, fluffy, 5-20 cm long and up to 2.5 cm in diameter. Spikelets are numerous, 3.5-5.0 mm long, each surrounded by a basal ring of silky hairs 10 mm long. The grain is oblong, pointed, brown and 1-1.5 mm long [6].



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Based on a snapshot of data from an ethnobotany survey, and added data from several papers on ethnobotany in various regions of Indonesia, it has acquired 27 districts using alang-alang. A detailed description of the use of alang-alang by region or ethnicity is presented in the following tables (Table 1 and Table 2).

Table 1. Use of alang-alang as medicine (ethnobotany data from Bogor Botanical Gardens)

No.	User area (ethnic)	Local name	Usefulness of drug	How to use
1.	Indramayu (Sunda-West Java)	Alang-alang	1.Wound or hurt 2.Sore, aches	1.Crushed roots and then placed on the wound. 2. Grass roots and the roots of nut boiled together, then this potion drunk to treat aches
2.	Cirebon (Sunda-West Java)		Kidney disease	Grass roots plus avocado leaves and <i>Orthosiphon aristatus</i> leaves, boiled, drunk
3.	Cianjur (Sunda-West Java)	Eurih	Hipertention	Grass roots boiled, drunk
4.	Cilacap (Central Java)	Alang-alang	Urinary stones	Grass roots , the roots of young <i>Areca catechu</i> , black sugar cane and papaya root, boiled, drink it 2-3 times a day.
5.	Ponorogo (East Java)	Alang-alang	Back pain	Grass roots dried, then ground and brewed with hot water, drunk
6.	Sentani (Papua)	Demekenya	Fever	Grass roots boiled with water until boiling, then drunk
7.	Tenganan (Bali)	Ambengan	Make black hair / hair conditioner	Grass roots pounded until somewhat smooth, boiled, the water used to wash the head 1-2 times a day
8.	Kulawi (Central Sulawesi)	Alang-alang	Aprodisiac	Grass roots boiled with water until boiling, then drink a glass a day
9.	Flores (East Nusa Tenggara)	Uru liwang	Hipertention	Grass roots boiled, drunk
10.	Subang (Sunda-West Java)	Alang-alang	Wound	The leaves are crushed, placed on the wound
11.	Sukabumi (Sunda-West Java)	Eurih	Wound	The leaves are crushed, placed on the wound
12.	Madiun (East Java)		Sore, aches	Leaves of grass and basil leaves, crushed, plus water, then smeared
13.	Purwokerto (Central Java)	Ilalang	Wound	The leaves are crushed, placed on the wound
14.	Takengon (Aceh)	lalang	Scabies	Old flower pounded, then smeared

Information about the use of alang-alang not only obtained from Bogor Botanical Garden ethnobotany team, but also obtained from papers written by researchers from other institutions. Some examples include the following.

Table 2. Use of alang-alang in some areas based on data from several ethnobotany papers

No.	Etnich (district)	Local name	Useful	How to use	Literature
1.	Bonebolango (Gorontalo)	Padengo	Blood urine	Wash roots of the grass to clean, cut into small pieces, then boiled with 8 cups of water. After remaining 4 cups, divided into 3 equal parts to be taken 3 times a day	[7]
2.	Muna (Southeast Sulawesi)	Alang-alang	Hipertention Kidney stones	Grass roots and bark of coconut boiled and then drunk Grass roots mixed with palm fronds, boiled, then drunk	[8]
3.	Way Jepara, (East Lampung)	Alang-alang	Impotence and jaundice	The roots are boiled	[9]
4.	Cikondang, Bandung (West Java)	Eurih	Tonicum	Boils the rhizome and stem of eurih added by coconut root (<i>Cocos nucifera</i>), papaya root (<i>Carica papaya</i>), jambe root (<i>Areca catechu</i>), and ginger rhizome (<i>Zingiber officinale</i>)	[10]
5.	Sakai (Riau)	Lalang	Heatburn	The roots boiled, drunk	[11]
6.	Morenene (Southeast Sulawesi)	Alang-alang	Internal disease	Grass roots washed and then boiled, water decoction taken daily in warm conditions	[12]
7.	Wawonii (Southeast Sulawesi)	Le	Hipertention and internal disease	The roots boiled, drunk	[13]
8.	Dayak Iban (West Kalimantan)	Lalang	Sore eyes	Shoots squeezed , dropped on eyes	[14]
9.	Adat Dukuh, Garut (West Java)	Akar eurih	Heatburn, Fitness, and health.	Grass roots boiled and then drunk Leaves tied around the waist	[15]
10.	Buton (Southeast Sulawesi)	Dhana	Internal disease	The roots are boiled , then drunk	[16]
11.	Mandar (West Sulawesi)	Paran	Wound ,	Flowers placed on the wound The leaves are rubbed on the wound	[17]
12.	Dayak Ngaju (Central Kalimantan)	Alang-alang	Constipation Back pain	The leaves are boiled, drunk Potion	[18]
13.	Dayak Tunjung (East Kalimantan)	Halalang	Bleeding and toothache	Not explained	[19]

Furthermore, from table 1 and table 2 above, then tabulated the types of diseases or health problems that can be treated by alang-alang in the following figure (Fig 2).

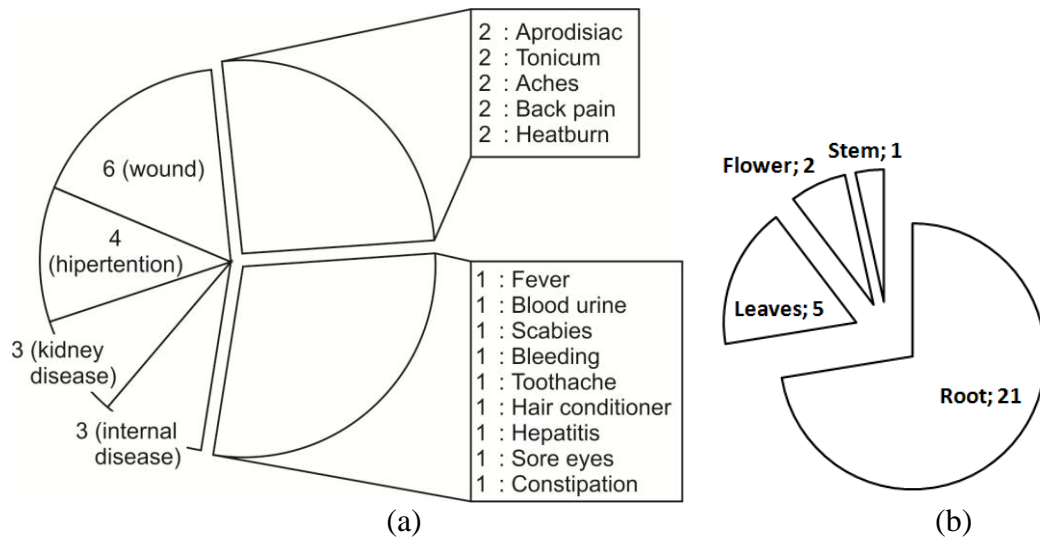


Figure 2. Health problems or illnesses treated by alang-alang (a)
 Parts of the alang-alang used by ethnic (b)

Based on the results of field surveys obtained the 14 regions and is based on literature survey obtained 13 districts using alang-alang as natural remedy, bringing the total in this paper obtained 27 areas that take advantage of alang-alang as a treatment. The twenty-seventh of this area is assumed to be 27 different ethnicities that could be representative of the larger islands and most populous island in Indonesia, hereinafter in this paper is considered as a user. Distribution of the alang-alang as a remedy in this case is in Sumatra (3 area), Java-Bali (12 area), Kalimantan (3 area), Sulawesi (7 area), NTT and Papua (2 area). Thus it can be said that the alang-alang is an essential part of the lives of the people of Indonesia, especially in terms of health and traditional medicine.

Based on that data (Fig 2b), used parts of the alang-alang is part of the root / rhizome (18 users), the stem (1 user), flower parts (2 users) and the leaves (7 users). Roots were a common part used as medicine. This is possible because this section that most contain active chemical substances and have a taste of a more adaptive to the mouth organ compared to other plant parts. Dalimartha [20] mentions that the grass roots of its sweet taste and cool, can stop bleeding and relieve heartburn. Grass roots according to the research Mardina [21] has a high adsorption capacity of calcium in the river, so the possibility also of calcium contained in the roots of this effect in some cases such as the treatment of kidney stones. In addition, according Dhianawati and Ruslin [22] alang-alang root extract also contains phenolic compounds and antioxidant activity. Meanwhile, according to research Parkavi [23] extract of water and ethanol extracts of alang-alang leaf has antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, are bacteria that cause infections in the digestive organs resulting in acute diarrhea.

Research of Ayeni and Yahaya [24] showed that the leaf extract of alang-alang contain tannins, saponins, flavonoids, terpenoids, alkaloids, phenols and cardiac glycosides. The result was the same as the study of Krishnaiah [25] showed that the leaf extract of alang-alang contain $0.45 \pm 0.18\%$ alkaloid; $9.3 \pm 0.11\%$ tannins; $1.4 \pm 0.02\%$ saponins; $0.32 \pm 0.16\%$ flavonoids and $0.05 \pm 0.25\%$ phenols.



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The phytochemical compounds in pharmaceuticals can be used as a remedy for diarrhea, headache, skin diseases, and intestinal tract. Alkaloids and saponins used for hypertension treatment [26] and also exhibits antiinflammatory [27]. Tannins can used of medicinal to prevent urinary tract infection and intestinal disorders (dysentery and diarrhoea) [28]. This is likely to be the cause of the roots and leaves used as a drug more than the other plants part in the alang-alang.

Most disease treated by alang-alang is wound (see Fig 2) mainly stabbed or cut wounds. This is understandable because in general alang-alang are growing around plantations, rice fields or gardens owned by the community, so the grass close to the lives of the farmers or cultivators. These farmers are often affected by the disaster, which affected a stab or slice a sharp knife, that knife he used daily. The first practical help is by using the foliage growing around them like alang-alang. Indonesian communities in the western part (Sumatra, Java, Kalimantan) more use of alang-alang as a cure wounds, back pain, aches and beverage health or fitness of the body, whereas in eastern Indonesia (Sulawesi-NTT-Papua) treatment with alang-alang more toward the disease, high blood pressure and fever. This can be related to the public health conditions, each region has a different health experience. According to a report issued by the Ministry of Health [29], a high prevalence (above national) for diseases such as hepatitis and fever in malaria and dengue fever, are more common in the eastern part of Indonesia such as Sulawesi, Nusa Tenggara, Maluku and Papua. The data says 10 of the 13 high-prevalence provinces to hepatitis located in eastern Indonesia, while 10 of the 15 provinces was a high prevalence of malaria and dengue fever are also from the eastern part of Indonesia. As for the problem of diseases related to bone joints (such as aches and pains lumbar) regions of Sumatra, Java and Kalimantan have an average prevalence is higher than the national prevalence.

Basically alang-alang can be used singly or as part of certain medicinal herb. Twenty (20) the above-mentioned areas, they use alang-alang singly, while seven other regions tend to use it as part of the herb. As part of the herb, usually alang-alang acts as an amplifier other plants toward the intended treatment, such as herb for treating pain of kidney stones, the grass have staged nature of urine (diuretic). Meanwhile for the use of alang-alang singly, people usually believe that empirically alang-alang can overcome the disease or illness without mixture of other materials. The use of single are generally used for the treatment of mild disease such as sores, abdominal pain or just as a health drink. While more complex problems such as kidney stones, the grass are usually used as ingredients (mixed) with other materials.

How to use alang-alang as natural medicine are quite varied, depending on the type of disease to be overcome. For diseases related to internal organs, it usually taken orally, while the diseases that are related to the outside of the body is usually quite smeared or pasted. For certain circles, the grass are considered to have magical powers so that its use simply by tying this plant at the waist. There are 18 areas that consume the grass orally as beverages, either singly or as a mixture of herbs and 9 other users do not consume orally. How to use the grass in general is to boil or simply brew. There are 18 users using this method. The rest is by drip (1 user), rubbed (1 user) and flaked / pasted / smeared there are 8 users. Alang-alang roots also contain starch and sugar so easy to chew, therefore in certain cases the roots pretty chewed or squeezed.



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4. Conclusion

Alang-alang have an important role in traditional medicine. Based on the 27 areas of ethnobotany survey obtained diverse use of alang-alang as natural remedy. It used either singly or in a mixture with other materials. Most part of the plant used are the roots followed by the leaves. Type of treatment most widely performed to treat wounds followed by the treatment of high blood pressure and kidney stones. Utilization of alang-alang as the natural remedy can be said to be equally spread across Indonesia.

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