

# Ethnobotanical Study of Herbal Medicine in Ranggawulung Urban Forest, Subang District, West Java, Indonesia

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## ABSTRACT

Ethnobotanical study is the first time study done in Subang District focused in the surrounding area of Ranggawulung Urban Forest (RUF). This study is related to plants diversity in Ranggawulung urban forest which is under the management of PT. Pertamina EP Field Subang. The purpose of study was to investigate and collect information from local people on the use of medicinal plants in Subang District. The field study was conducted from October-November 2015 in Subang District through deep personal interview and questionnaire then all information were written and documented. Based on the diversity index of Shannon Wiener, RUF was categorized in high diversity ( $H' = 3.64$ ). The total number of individuals in RUF was 1655 individuals belonging to 179 species from 101 families and only 32 species used for traditional medicines among local peoples. The highest frequency of plant parts used were leaves (47%) and fruit (17%), and followed with other parts of trunk, root, tuber, latex, bark and seed. The form of decoction was the most frequently prepared and administered orally. It was indicated that Skeleton-Muscular System Disorder (SMSD) and Endocrinal Disorder (ED) had the highest use reports which came from 19 species of plants belonging to 3 families (Moraceae, Meliaceae and Myrtaceae) to heal diseases including diabetic and back pain/rheumatism. It can be stated that higher index of diversity in RUF did not directly affect the use of plants for traditional medicine. Socialization of herbal medicine used among local people has to be improved as there are many species of plants are available to heal many diseases surrounding Subang District.

**Key Word:** Ethnobotany, medicinal herbs, Ranggawulung Urban Forest, Subang District

## INTRODUCTION

Indonesia is known as a country with source of megabiodiversity which is distributed from western (Sabang region) to eastern part (Merauke region). It can be understand, therefore, if there are approximately 30,000 species of plants, and approximately 9,600 species of which include medicinal plants (Health Department of Republic of Indonesia 2007). It has been identified more than 1,800 species of plants on the several forest formations, but until today utilization is only 940 species and only 300 species have been used in drug industries (Indonesian Institute of Sciences 2014).

Along with public awareness of health enhancement and increasing medicinal price, nowadays the use of traditional herbal medicine is not only more popular in Indonesia (Abdillah et al. 2014; Efremila et al. 2015) but also in Asian Pacific countries (Yabesh et al. 2014; Lone et al. 2012; Ali-Shtayeh et al. 2008) and Africa (Chekole et al. 2015); Maroyi 2013). The causes are because of relatively lower cost, ease of use and minimal side effects compared with using synthetic and modern medicines. Some people

also believe that traditional herbal medicines are able to treat a variety of diseases, such as fever, dysentery, skin diseases, poison bites, wounds, ulcers, rheumatism (Yabesh et al. 2014; Sankaranarayanan et al. 2010; Soejarto et al. 2011).

Certain parts of the plant that is often used for the treatment are leaves, bark, stem, fruit and root or tubers, which are then processed as a medicinal ingredient. In district of Kerala-India, leaves are widely used as a medicinal ingredient (Yabesh et al. 2014). In addition, plant species are used as medicinal ingredients, mostly from the wild, the same as people at Maonan-Southwestern China (Hong et al. 2015).

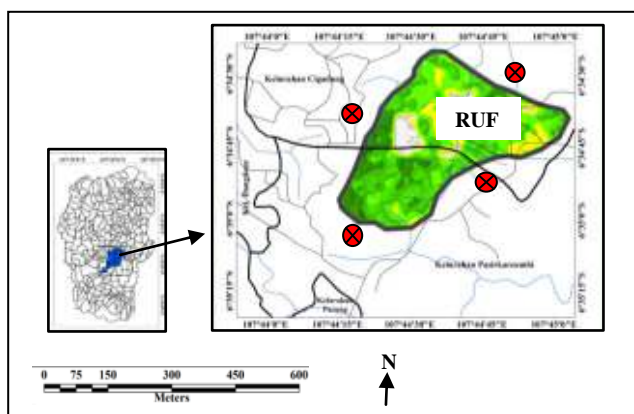
Ranggawulung's urban forest (RUF), administratively managed by two government agencies which are Department of Forestry and Plantation which was dominated by variety of plants including medicinal plants (Anonymous 2014). In 2012, It was approximately 4192 individuals belonging to 138 families of plants found in RUF and its surrounding (Centre for Environmental Studies UIN Jakarta 2012). Definitely, RUF has a high potential source of herbal medicine use. Unfortunately, current condition indicates that it is still not optimal utilization of biodiversity by local

people of surrounding RUF. This is due to poor knowledge and information about the benefits of plants in RUF and surrounding areas. In addition, the surrounding community has not been optimally used the plants for medicine ingredients. Therefore, this study was aimed to inventory potential medicinal plants in RUF and its surrounding that was utilized by local people to cure various diseases.

## MATERIALS AND METHODS

Ranggawulung's urban forest is located in the district of Subang, West Java with an area of 84 hectares at an altitude of 700 asl. This is administratively included in Subang district, which has a strategic potential conservative area providing ecosystem services for communities in Subang area. Level of rainfall in Subang is 1600-3000 mm/year which is caught into 3 watersheds (Ciasem, Cipunagara, and Cilamaya). Subang district has unique topography divided into 3 zones which are mountain (in southern), hilly and plains (centre), and lowland (Northern) (Anonymous 2014).

This research had been carried out in the urban forest of Ranggawulung from October-November 2015. The research method was more referring to the results of observations, discussions and personal deep interview. The informants used in this survey were 47 persons were selected randomly between the ages of 31-75 years old at the region of western,



**Figure 1.** Map of Subang showing Ranggawulung's Urban Forest and sampling sites of study

eastern, southern and northern of RUF, approximately living less than 1 km in distance. The age of informants is an important parameter which can influence the level of knowledge about the use of plants for medicine (Hong et al. 2015).

The substances of the interview and discussion were including type of plant used for herbal medicine, parts of plants used, the preparation and application of plants for medicine, and the type of ailment. Then, all data was analyzed descriptively which was related to diversity of plants in RUF itself.

## RESULTS AND DISCUSSIONS

Plant biodiversity presented in RUF has the potential to be developed as a medicinal plant which was categorized in high diversity ( $H' = 3.07$  for shrub and  $H' = 3.64$  for tree) based on Shannon Wiener's index of diversity. It was found approximately 1655 individuals belonging to 179 species from 101 families whereas 32 species belonging to 12 families were used as traditional herbal medicine (Table 1). This is a huge number of species of medicinal plants in RUF, Indonesia compared to other urban forest in Asia and Africa Countries such as India and Ethiopia which have lower number (Lone et al. 2012, Yabesh et al. 2014, Chekole et al. 2015).

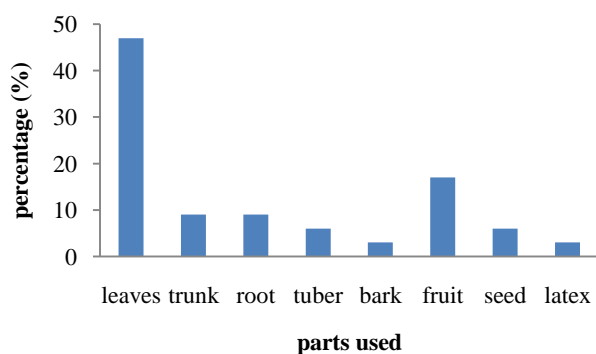
Recently, PT. Pertamina EP field Subang has been playing an important role in management of RUF in providing medicinal plants started from 2010. Diversity of plants showed increasing trend but it was not followed by number of individual which decreased significantly to 153%. The main cause was land use change into other uses such as rice field, crop plantation, recreational area and also destructive activities including sand mining and trees logging. This is need rapid intervention from regional government, including PT. Pertamina itself and also local community to conserve the ecosystem services provided by RUF.

The parts of tree used for medicine among people surrounding RUF were mostly leaves (47%) and fruit (17%) and other parts also used were trunk, root, tuber, seed, bark and latex (Figure 2). The easy use and existence were the main reasons people took these parts to heal diseases. Back pain and diabetic were the highest percentage of symptoms suffered by Ranggawulung's community reached 18-19% (Figure 3) which were categorized in Skeleton-Muscular System Disorder (SMSD) and Endocrinal Disorder (ED) as the dominant ailment found among people than other ailments. Those diseases were mostly treated from part of *Swietenia mahagoni*, *Artocarpus heterophyllus* and *Syzygium polyanthum*.

Based on many researches, it was proved that *Swietenia mahagoni*, *Artocarpus heterophyllus* and *Syzygium polyanthum* contained many important organic compounds which were flavonoid, saponin and alkaloid terpenoid and steroid (Sahgal et al. 2009, Linghuat 2008, Asaeli 2013). It was found that *Swietenia mahagoni* was provable to decrease blood glucose level in white mice with the doses of 250 mg/kg body weight (Suryani 2013). Asaeli (2009) also found antidiabetic effect in the dose of 1.5 g/kg body weight in *Artocarpus heterophyllus*. Bay leaves (*Syzygium polyanthum*) were also reported by Taufiqurrohman (2015) has potential as an antidiabetic drug. Those were the reasons why the people surrounding RUF always used these plants as they had already got the positive medical effects, although they did not anything about the active ingredients inside those plants.

**Table 1.** Medicinal Plants Found in the area of RUF

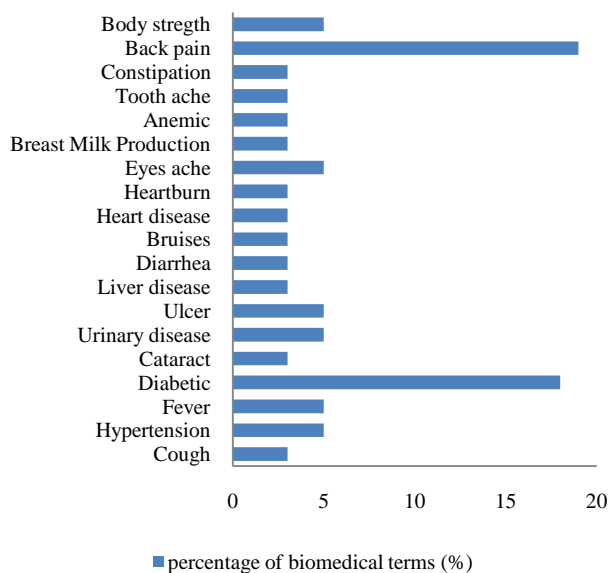
No	Botanical Name	Family	Local Name	Parts Used	Preparation	Application	Ailment Category
1	<i>Centella asiatica</i>	Apiaceae	Antanan	Leaves	Decoction	Oral	Cough
2	<i>Manihot utilisima</i>	Euphorbiaceae	Singkong	Leaves, Tuber	Juice mixed with brown sugar, raw	Oral	Diarrhea, Anemic
3	<i>Polyscias guilfoylei</i>	Araliaceae	Kadondong Lalap	Leaves	Boiled	Oral	Urinary Disease
4	<i>Abelmoschus manihot</i>	Malvaceae	Daun Nedi/Daun Mujarab	Leaves	Juice mixed with water	Oral	Fever
5	<i>Ageratum conyzoides</i>	Compositae	Babadotan	Leaves	Paste	Topical	Wound
6	<i>Dracaena angustifolia</i>	Ruscaceae	Daun Suji	Leaves	Boiled	Oral	Hypertension
7	<i>Swietenia macrophylla</i>	Meliaceae	Mahoni	Seed	Raw	Oral	Diabetic
8	<i>Areca catechu</i>	Arecaceae	Jambe	Root	Decoction	Oral	Back Pain / Rheumatism
9	<i>Arenga pinnata</i>	Arecaceae	Aren	Root	Decoction	Oral	Back Pain / Rheumatism
10	<i>Solanum torvum</i>	Solanaceae	Takokak	Fruit	Raw	Oral	Diabetic
11	<i>Cocos nucifera</i>	Arecaceae	Kelapa	Fruit	Baked and the water mixed with brown sugar	Oral	Urinary disease
12	<i>Syzygium cumini</i>	Myrtaceae	Jamblang	Bark	Powder	Oral	Diabetic
13	<i>Mimosa pigra</i>	Leguminosae	Buset	Leaves, Trunk	Decoction	Oral	Diabetic
14	<i>Leucaena leucocephala</i>	Fabaceae	Petai Cina	Seed	Powder	Oral	Diabetic
15	<i>Syzygium polyanthum</i>	Myrtaceae	Salam	Leaves	Decoction	Oral	Diabetic
16	<i>Persea americana</i>	Lauraceae	Alpukat	Leaves	Decoction	Oral	Back Pain / Rheumatism
17	<i>Pterocarpus indicus</i>	Fabaceae	Angsana	Latex	Latex	Dripped	Tooth Ache
18	<i>Sauropus androgynus</i>	Phyllanthaceae	Katuk	Leaves	Juice mixed with water	Oral	Breast Milk Production
19	<i>Ceiba pentandra</i>	Malvaceae	Randu	Leaves	Decoction	Oral	Fever
20	<i>Vernonia amygdalina</i>	Compositae	Pohon Afrika	Leaves	Decoction	Oral	Back Pain / Rheumatism
21	<i>Artocarpus altilis</i>	Moraceae	Sukun	Fruit	Decoction	Oral	Heart Disease
22	<i>Artocarpus heterophyllus</i>	Moraceae	Nangka	Leaves	Decoction	Oral	Back Pain / Rheumatism
23	<i>Tamarindus indica</i>	Fabaceae	Asem	Fruit	Paste	Topical	Eliminate bruises
24	<i>Hibiscus tiliaceus</i>	Malvaceae	Waru	Trunk	Liquid secretion	Dripped	Eyes ache
25	<i>Capsicum frutescens</i>	Solanaceae	Cengek	Leaves	Paste	Topical	Constipation
26	<i>Averrhoa carambola</i>	Oxalidaceae	Belimbing	Fruit	Raw, Juice	Oral	Hypertension
27	<i>Solanum nigrum</i>	Solanaceae	Leunca	Fruit	Raw	Oral	Body strength
28	<i>Imperata cylindrica</i>	Poaceae	Alang-alang	Root	Decoction	Oral	Body strength
29	<i>Graptophyllum pictum</i>	Acanthaceae	Handeleum	Leaves	Decoction	Oral	Liver disease
30	<i>Costus spicatus</i>	Costaceae	Pacing	Trunk	Juice mixed with water	Oral, Dripped	Diabetic, Heartburn, Eyes ache
31	<i>Parkia speciosa</i>	Fabaceae	Pete	Leaves	Paste	Topical	Ulcer
32	<i>Allium cepa</i> L.	Amaryllidaceae	Bawang Merah	Tuber	Raw mixed with water	Cleaning solution	Cataract



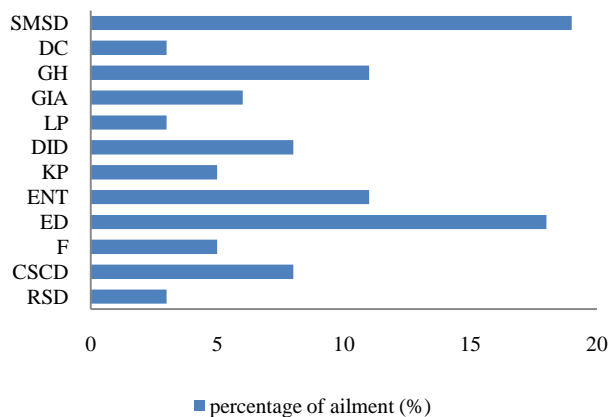
**Figure 2.** Percentage of plant parts used for the preparation of medicine

The ailment type dominantly found among people surrounding RUF were Skeleton-Muscular System Disorder (SMSD) and Endocrinal Disorder (ED), General Health (GH) and Ear, Nose and Throat Problems (ENT) (Figure 4). These ailments are almost similar occurred in India (Yabesh et al. 2014), Zimbabwe (Maroyi 2013) and Palestine (Ali-Shtayeh 2008) which leaves and roots were more widely.

Unfortunately, rather than using medicinal plants, people living surrounding RUF apparently preferred to use chemical medicine accepted from local health center. The Indonesian government program of Health Card (Kartu Sehat) is one of the reasons why were more people preferred to go to the health centre than using traditional herbal medicine.



**Figure 3.** Percentage of biomedical terms suffered by people surrounding RUF



**Figure 4.** Percentage of ailment

Using Health Card given by Indonesian government, the society will get free medical treatment and they did not have to take long distance to get local health centre as the centre was spread in each village. This condition is good but the abundance of herbal plants in home garden and urban forest was other positive benefit taken by people as ecosystem services. In the future, it is hoped that herbal medicine can be used dominantly in local health centre through intensive scientific analyzes of medicinal plants.

The awareness of regional government and PT. Pertamina EP field Subang as a stakeholder in management of RUF and conservation of medicinal plants were good enough which was showed by the planting program of medical plants in RUF. It had been demonstrated that the cultivated herbal plants including shrub and tree reached

58% were found in RUF. Some of medicinal plants planted in RUF since 2012 and until 2015 had already grown significantly which were *Syzygium polyanthum* (2-3 cm dbh), *Acacia mangium* (4-5 cm dbh), *Alstonia scholaris* (2-12 cm dbh). Unfortunately, other species planted were dead which were *Parajubaea sunkaha*, *Gmelina arborea*, and *Cinnamomum verum* as destructive activities by local people and poor maintenance. This program done was definitely to conserve biodiversity of Subang district that could be extinct one day if mitigation and conservation acts do not take into account in their regional landscape plan.

## CONCLUSION

It was found 32 species of plants used for traditional medicines among local peoples surrounding Ranggawulung's Urban Forest. Leaves and fruit were the highest frequency of plant parts used reached 47% and 17%, then was followed with other parts of trunk, tuber, latex, bark and seed. The form of decoction was the most frequently prepared which was usually administered orally. Skeleton-Muscular System Disorder (SMSD) and Endocrinal Disorder (ED) were the ailments which had the highest use reports came from 19 species of plants belonging to 3 families (Moraceae, Meliaceae and Myrtaceae) to heal diabetic and back pain/rheumatism symptoms.

Unfortunately, higher index of diversity in RUF ( $H' = 3.64$ ) and surrounding area particularly private garden or yard did not directly affect the use of plants for traditional medicine. Socialization of herbal medicine used among local people has to be improved as there are many species of plants are available to heal many diseases surrounding Subang district. The role of PT. Pertamina as a stakeholder of RUF has to be enhanced in terms of conservation through mitigation, monitoring and maintaining biodiversity in RUF so ecosystem equilibrium can be reached and sustained for long period.

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