The potential and conservation of medicine plants in Central Kalimantan

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Abstract. Central Kalimantan consist of various type of lands e.g. peats soil, acid sulphate and uplands. Potential of the medicinal plant in Central Kalimantan forest is scattered in various forest areas and it is in high diversity various life form and uses. Method of study: exploration and collection conducted in five districts, i.e. Kotawaringin Timur, Kotawaringin Barat, Barito Selatan, Barito Utara and Murung Raya, starting from March 2016 until December 2018. The aims of this study was as follows: (1). The exploration process, (2). The ex-situ and in-situ conservation, (3). The characterization process, (4). The documentation process. The results of these activities involve ex situ collection of 5 accessions of medicinal plants that can be used as a source of biofarmaca. Medicinal plant conservation could be through in-situ and or ex-situ. The in-situ conservation held by managing the forest area as the natural habitat of the medicinal plants, while the ex-situ conservation held outside of the native habitats. Appropriate utilization and research activities are important in conservation of the medicinal plants Central Kalimantan.

1. Introduction

Indonesia is a Mega Diversity Country because it is in 2nd place after Brazil which has an abundant diversity of genetic resources such as ornamental plants, medicinal plants, fruits, animals and various other types. One of the most beneficial diversity of genetic resources is medicinal plants. This plant is one of the biodiversity that has many benefits because it is the basic ingredient for traditional medicine. Indonesia has been dubbed the Live Laboratory with a high medicinal plant wealth potential of about 35,000 types of medicinal plants. However, only 1,000 species have been recorded and about 300 types have been utilized for traditional medicine [1].

Central Kalimantan Province covers area of 13,80,000 hectares or about 7.93% of Indonesian area and consists of coastal region open waters and open land area, owns a potential biodiversity such as herbal medicine. This massive land area consists of various types of land. The wide area combined with high variability of land may resulted in a variability of genetic diversity resources medicinal which were found in Central Kalimantan [2].

The knowledge of the utilization of medicinal plants in Central Kalimantan is the cultural heritage of the nation based on knowledge and experience passed down through generations to the present generation. The use of folk remedies for health maintenance and disease disorders to date is still much needed and needs to be developed because the herb taken is not toxic in the human body[5]. The efficacy of medicinal plants has been proven by the continuous use by the community so that it becomes a culture for the planting of medicinal plants personally until now [3]. The desire of the
community to return to nature became a factor in the development of medicinal plants in lieu of alternative medical medicine made of chemicals.

Ethnobotany is a science related to the utilization of plants by the community through generations and over a long period of time. The contribution and role of ethnobotany is very broad and diverse both in the current and future generation. Data at the Herbal Expo 2010 shows that the public's interest in using traditional medicine continues to increase based on the concept of back to nature (back to nature) [4]. This condition is supported by the WHO (World Health Organization) which states that the use of medicinal plants does not cause side effects during use as directed by elders who have used it for generations.

2. Material and Methods

2.1. Location

The research was conducted in North Barito Regency, Gunung Mas, West Kotawaringin Murung Raya and South Barito for 2 years (2016-2018).

2.2. Materials

The materials used in this study are plant exploration equipment, interview equipment and herbarium manufacturing equipment. Plant exploration equipment in the form of a tally sheet inventory of medicinal plants, GPS, medicinal plant manuals such as field guide Heyne, Characterization was carried out including qualitative and quantitative characters for leaves, flowers, fruit, stems, roots, hilum and feathers.

2.3. Research procedures

Characterization was carried out to identify specific physical and physiological properties. Standard characterization refers to the descriptor list which is guided by the Indonesian Research Institute for Spices and Medicines Plant Resources of Southeast Asia (PROSEA), labels, clear plastics, sewing meters and cameras. Interview equipment in the form of interview guides and cameras. Herbarium manufacturing equipment in the form of 70% alcohol, newspaper, plastic bags, cutters and specimens. Samples for testing are prepared through several stages. The plant parts of the sample were washed in running water and dried at room temperature then mashed in a blender then sieved with a 65 mesh sieve. Sample extraction was carried out by maceration using 70% ethanol solvent with a ratio of 1:5 (sample and solvent) for 24 hours at room temperature [6]. The ethanol extract was then concentrated using a rotary evaporator and the results were used for phytochemical testing. Phytochemical screening (alkaloids, steroids, flavonoids, tannins, saponins, triterpenoids, and hydroquinone) was performed using the Harborne method. Alkaloid test. A total of 1 g of sample was dissolved in 10 ml of chloroform and 4 drops of NH$_4$OH, then filtered and the filtrate obtained was put in a closed test tube. The chloroform extract in the test tube was shaken with 6 ml of H$_2$SO$_4$ 2 M. The acid layer formed was then dropped on the drop plate and then added with Mayer, Wagner and Dragendorf reagents. 2. Test flavonoids. 10 ml of filtrate plus 0.5 g of Mg powder, 2 ml of concentrated HCl and 20 ml of amyl alcohol were then shaken. A positive result is indicated by the formation of red, yellow, and orange colour. 3. Saponin test. A total of 10 ml of filtrate was put in a closed test tube then shaken for 10 seconds and then let stand for 10 minutes. Saponins are indicated by the formation of a stable foam in the sample. 4. Test steroids and triterpenoids. The sample was added with 25 ml of hot ethanol 50°C then filtered and evaporated to dry. The remaining residue is dissolved with ether and then added with 3 drops of anhydrous acetic acid and 1 drop of concentrated H$_2$SO$_4$. Positive steroid results are indicated by the formation of a blue or green color while triterpenoids are indicated by the formation of a red or purple color. 5. Test tannins. The sample was added with 100 ml of hot water and boiled for 5 minutes then filtered. The filtrate obtained was added with 1% FeCl$_3$ solution. A positive result is indicated by the formation of a greenish black color. 6. Hydroquinone test. The sample was reacted with 1 N NaOH and then observed the color change. Positive results are indicated in yellow. 7. Test antioxidant activity. The antioxidant activity test was
carried out using the spectrophotometric method [7]. The source of free radicals used was 1,1-diphenyl-2-picrylhydrazyl (DPPH). The test analysis was carried out by looking at the color change of each sample after incubation with DPPH. The electrons in the DPPH will pair with the electrons in the sample so that the sample color changes from dark purple to bright yellow.

3. Results and Discussion

Utilization of medicinal plants as medicine using leaves, roots, fruit, stems, bark, rhizomes, flowers, and tubers. People believe that roots are the strongest part and are more able to last longer than other parts of plants. Root herbs are more mixed with other types of medicinal plants than in a single way. According to Ai and Torey (2013), the root is where the absorption of water and nutrients in the soil before heading towards the leaves so that the volume of water decreases, then the rooting system generally increases looking for places that have abundant water volume while the growth of the header decreases [8].

The diversity of medicinal plants in the inland region of Central Kalimantan comes from plants that grow wildly and are cultivated by the community. The results of identification and interview, with key informant that the status of cultivation of medicinal plants utilized dayak community is divided into two namely, cultivation and wild. Hidayat (2011) added that there are still many medicinal plants in Indonesia that have not been cultivated, so his willingness still depends on nature (Table 1) [9].

For Southeast Asians the leaves of Tabat Barito have been used as folk remedies to treat diabetes mellitus, inflammation, diarrhea, and infection. Although as a traditional medicine FD is used to overcome various diseases, the bioactivity that has been tested includes anti diabetes mellitus, anti-cancer, anti-obesity, anti-microbial, oxyacyclic, anti-inflammatory and anti-oxidant.

Tawas Ut root Identification results found saponin, tannin, and flavonoid compounds. High flavonoid content in samples can increase resistance and may reduce blood capillary permeability, which interferes with the transportation of metabolism in the blood. The higher the content of flavonoids, the increase in enzymes in the blood. Proper dosing creates degeneration with the exit of degeneration from the cell nucleus to the outside of the cell by 25% so as to repair liver damage [10].

Bioactivity of Tabat Barito (Ficus deltoidea) as anti diabetes mellitus, anti-cancer, anti-microbial, aprosidiac, anti-inflammatory, antioxidant and anti-obesity in Marina (2019) [11]. The plant activity of the drug is related to its secondary metabolite content especially ursolic acid, phenolate, flavonoids, isovitexsin, moretenol, betulin, lupenone, and lupeol (Table 2).

The active chemical compound content of the yellow root is Fibaruretin B (with a systemic name: 2ß,3α-dihydroxy-2,3,7,8α-tetrahydropenlanthic acid lactone), C20H24O7, Furanoditerpenold, Four new furanoditerpene, 6-hydroxyarcangelisin (la), 2-dehydroarcangelisinol (2), tinophyllol (3a), and 6-hydroxyfibleucin (4b), isolated from Arcangelisia flava. The root part of the yellow root plant contains steroids, alkaloids, tannins, phenolhidrokuinon, and saponins. Arcangelisia flava stem extract produces palmatine, berberine, jatrorrhizine, dlhydroberberine, and 20-hydroxyecdysone. The results of (Angga D et al. 2016), study state that yellow root stems contain protoberberin alkaloid compounds consisting of berberin, jatrorrhizin, and palmatin [12]. Protoberberin alkaloids are reported to be active as antibiotics against both Gram-positive and Gram-negative bacteria. Alkaloid compounds (berberin and columnbin) can interfere with the cross-bridge formation of peptidoglican constituent components in bacterial cells, so that the lining of the cell walls does not form intact and causes the cell's death.
### Table 1. Characterization of Some Medicinal Plants as Biofarmaka Sources from Central Kalimantan

| Research | Local Name                     | Latin Name                   | Origin          | Habitus                                                                 | Root                                                                 | Stem                                                                 | Leaves                                                                 | Flowers and Fruit                                                                 |
|----------|--------------------------------|------------------------------|-----------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|          | Tawas Ut                       | Ampelocissus rubiginosa      | Gunung Mas      | Shrubs, wild plants, air temperature 30°C, humidity 80%, soil pH 6, soil temperature 29°C, soil moisture <5%, altitude 236 m above sea level | Taproot and brown.                                                   | Dark green stem color                                                   | Green leaf color with red leafbones and reddish leaf edges, opposite leaf location, obovate leaf shape, serrated leaf edge leading to the tip of the leaf (serrate) and a pointed base, and tapered leaf tips, the upper leaf surface is smooth (glabrous) and the lower part is rough (scabrous), the leaf bone is an arcuate type | Single leaf, in axillary, top shape, stamens and pistil arranged in circles, loose crown, sitting on ovary, nail red flowers, panicle-shaped, hairy, Unosexual flowers. The fruit is elliptical or ovoid, 10-20 |
|          | Tabat Barito                   | Ficus deltoidea              | Barito Selatan  | Trees, live in the forest temperature 28.9 °C, RH 90%, soil pH 7, soil temperature 27 °C, altitude 287 m asl, longitude E 114°52.51, and latitude S0°15.187. | Taproot                                                               | Upright, woody, round, many branches, rough surface, gummy, brown.   | True stem, upright growth direction, round shape, monopodial branching way, rough surface, brownish green color | Incomplete leaves, odd pinnate compound leaf type, lanceolate shape, tapered tip and base, flat edge, smooth blade surface, pinnate leaf arrangement, opposite leaf layout, green leaf color | Single leaf, in axillary, top shape, stamens and pistil arranged in circles, loose crown, sitting on ovary, nail red flowers, panicle-shaped, hairy, Unosexual flowers. The fruit is elliptical or ovoid, 10-20 |
|          | Pasak Bumi                     | Eurycoma longifolia Jack    | Murung Raya     | Liana, wild plants, air temperature 30°C, humidity 90%, soil pH 6, soil temperature 28°C, soil moisture <5%, altitude 251 m above sea level, longitude E 114°53.41, and latitude S0°15.154. | Root fibers, brown, yellow inside.                                   | True stems, growing vines, round, rough stem surface.                |                                                             |                                                             | Single leaf, opposite, flat leaf edge, wide egg shape rounded leaves to protrude. Petiole 0.25–5 cm long. |
|          | Akar Kuning                    | Coscinium franchetii Goeth.) | Kotawaringin Barat | Trees, with air temperature 34.3, humidity 77%, soil pH 6.5, soil moisture <5%, altitude 231 m asl, latitude E 114°52.29, longitude S0°15.187.. | Root fibers, brown, yellow inside.                                   |                                                             |                                                             |                                                             |                                                                 |
|          | Mengkudu Hutan                 | Fagraea racemosa             | Barito Utara    |                                                             |                                                             | woody stems                                                          |                                                             |                                                             |                                                             |                                                                 |

- b: Gunung Mas
- C: Barito Selatan
- D: Murung Raya
- e: Kotawaringin Barat
- f: Barito Utara
shape, reddish brown. Buni fruit, round, 3-5 mm in diameter, yellow.

| Uses          | Liver and stomach pain | Restoring medicine for new mothers | Backache refreshing body. | As a medicine for jaundice. | HIV medicine. |
|---------------|------------------------|-----------------------------------|--------------------------|----------------------------|---------------|
| Parts utilized| Stems and roots        | Bark, roots and leaves            | Stems and roots          | Stems and roots            | Bark and seeds |
| Propagation   | Cuttings               | Cuttings and seeds                | Cutting                  | Stem cuttings              | Cuttings and seeds |

| Medicinal Plant Name | Tawas Ut | Tabat Barito | Pasak Bumi | Akar Kuning | Mengkudu Hutan |
|----------------------|----------|--------------|------------|-------------|---------------|
| Saponin, flavonoid, tanin, alkaloid and steroid | Secondary metabolites: Ursolic acid, phenol, flavonoids, isovitexin, moretenol, betulin, lupenone, and lupeo | Quassin, neo-quassin, glaukarubin, sedrin, and eurycomanol (compounds that have 20 carbon atoms) | Alkaloid, flavonoid, phenol hidroquinon, triterpenoid. | Flavonoid, saponin, sterol-terpenoid alkaloid, and tanin |

**Table 2.** Biochemical Content of 5 Medicinal Plants in Central Kalimantan

4. **Conclusion**

In order to support preservation and management of local crops, relevant information of plant genetic resources should be organized into a data base system that can be further developed to become a decision support system. It can assist the planning process of preservation and management of local crops through the determination of development areas for *ex situ* and *in situ* conservation.

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