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BIODIVERSITAS

Journal of Biological Diversity

Volume 19 - Number 6 - November 2018

Biodiversitas

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5

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Subject Area and Category

Agricultural and Biological Sciences

Animal Science and Zoology

Plant Science

Biochemistry, Genetics and Molecular Biology

Molecular Biology

Publisher

Biology department, Sebelas Maret University Surakarta

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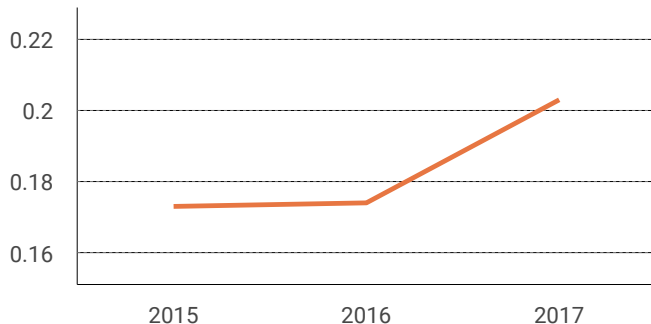
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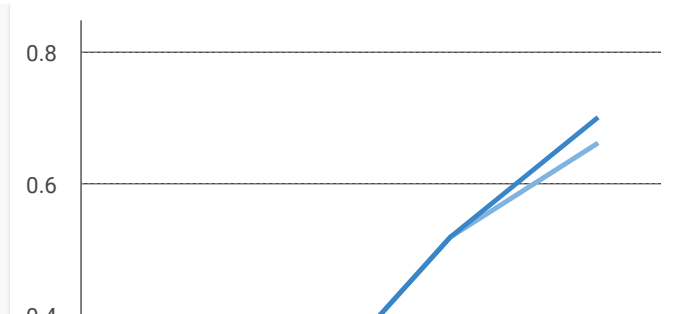
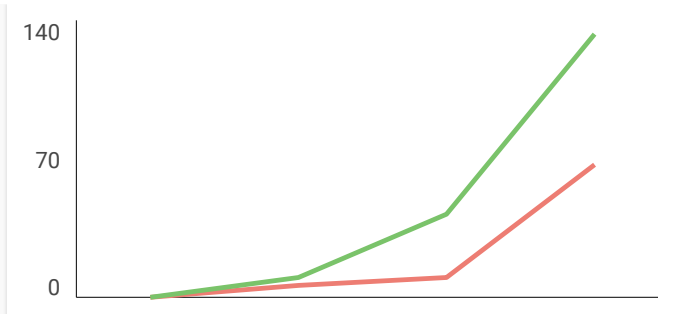
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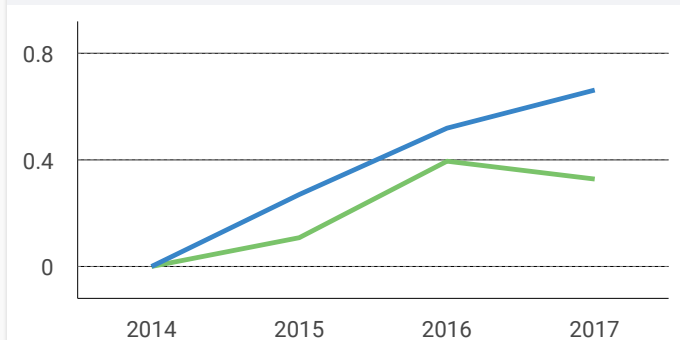
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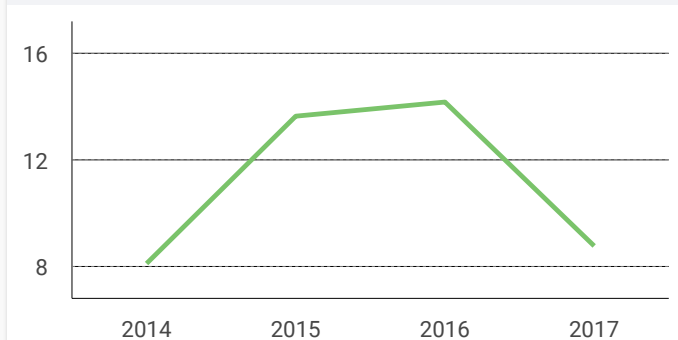
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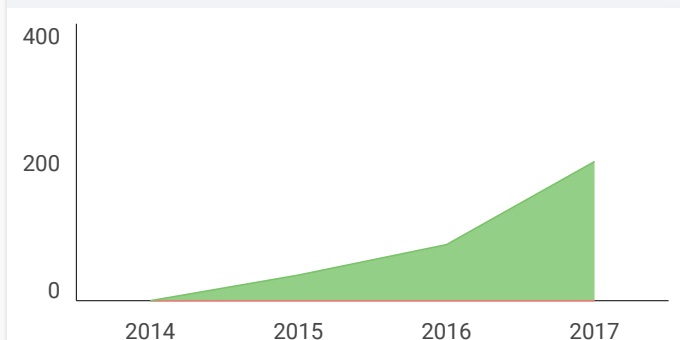
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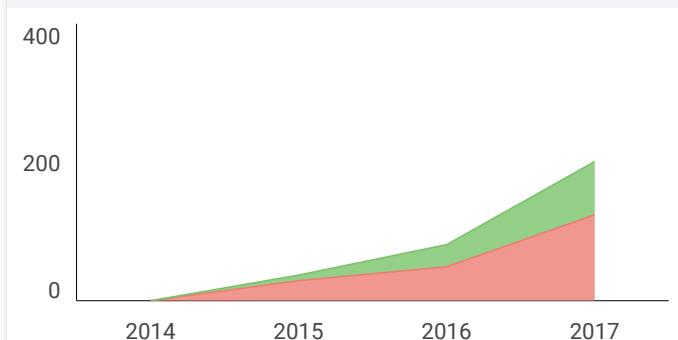
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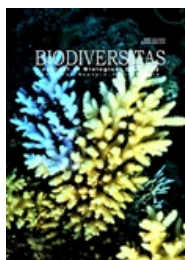
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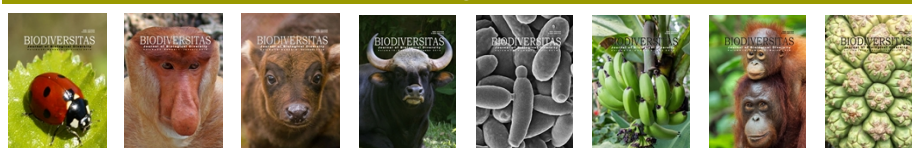
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20 (2) 2019 20 (1) 2019 19 (6) 2018 19 (5) 2018 19 (4) 2018 19 (3) 2018 19 (2) 2018 19 (1) 2018

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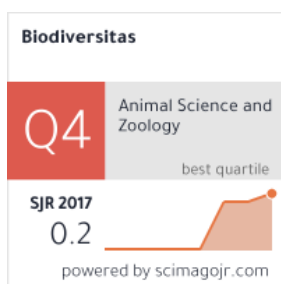
After the publication of Biodiversitas vol. 15, no. 2, October 2014, furthermore, all manuscripts will be published online as soon as the revision is approved (no time constraints), but they will be printed in the next issue, namely Biodiversitas vol. 16, no. 1, April 2015, and so on.

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Book:

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Chapter in book:

Webb CO, Cannon CH, Davies SJ. 2008. Ecological organization, biogeography, and the phylogenetic structure of rainforest tree communities. In: Carson W, Schnitzer S (eds) *Tropical Forest Community Ecology*. Wiley-Blackwell, New York.

Abstract:

Assaeed AM. 2007. Seed production and dispersal of *Rhazya stricta*. 50th annual symposium of the International Association for Vegetation Science, Swansea, UK, 23-27 July 2007.

Proceeding:

Alikodra HS. 2000. Biodiversity for development of local autonomous government. In: Setyawan AD, Sutarno (eds.) *Toward Mount Lawu National Park: Proceeding of National Seminary and Workshop on Biodiversity Conservation to Protect and Save Germplasm in Java Island*. Universitas Sebelas Maret, Surakarta, 17-20 July 2000. [Indonesian]

Thesis, Dissertation:

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Short Communication:

Inventory of traditional medicinal plants and their uses from Atinggola, North Gorontalo District, Gorontalo Province, Indonesia

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Abstract. Kandowangko NY, Latief M, Yusuf R. 2018. *Inventory of traditional medicinal plants and their uses from Atinggola, North Gorontalo District, Gorontalo Province, Indonesia. Biodiversitas 19: 2294-2301.* Medicinal plants have been used by the people of Gorontalo as a hereditary tradition. But this knowledge has not spread to the wider community because the traditional wisdom about medicinal plants has not been documented, stored and managed properly by employing digital tools. The purpose of this study is to prepare an inventory of the traditional medicinal plants and the details of their uses in Atinggola, North Gorontalo district, Indonesia. Data has been collected by ethnobotanical survey method and analyzed using the descriptive qualitative method. The study has shown that 38 species of medicinal plants, belonging to 20 families, are used to cure many diseases by the traditional healers of Atinggola. Among them, 6 species are used to treat fever, 5 species to treat skin diseases, 2 species each to treat cancer, gastrointestinal diseases, liver diseases, and as body tonic to restore power; 1 species each to treat toothache, malaria, tonsillitis, allergies, eye irritation, wound infections and tuberculosis (TBC). Plant parts used in the treatment practices are leaf, fruit, flower, rhizome, root, stem, seed, shoots, midribs parts, etc. However, the most dominant part used is the leaf of the plants. Various methods such as boiling, squeezing, scraping, chewing, smashing, brewing, etc. are used to prepare the medicines. 29 species (76.31%) of medicinal plants are collected from cultivated sources such as backyards and gardens while 9 species (23.68%) are still sourced from forests.

Keywords: Ethno medicinal diversity, Gorontalo, medicinal plant, traditional medicines

INTRODUCTION

Atinggola is one of the sub-district located in the district of North Gorontalo, Gorontalo Province, Indonesia. It is inhabited by several civil society groups who have come from Ternate, Sangir and Gorontalo. Atinggola communities still maintain their tradition regarding the use of medicinal plants. This is evidenced by the fact that there are still many traditional medicinal experts (healers or shamans) who utilize plants as the main raw materials in the treatments provided. Their knowledge of the use of plants as medicine is based on the experiences they have gained in trying to meet the treatment needs using a variety of local plants. The number of patients visiting these traditional healers of Atinggola is between 10-30 people/month per healer.

Also, many species of medicinal plants are found in the Atinggola region and the people use the various parts of these plants or whole plants to maintain the health of their family members. Their livelihood as farmers is also in line with their interest in using traditional medicinal plants for curing diseases and maintenance of family health and also the preservation of medicinal plants by cultivating them in backyards and gardens. Currently, there is a shift in their opinion regarding use of traditional medicines. They now know about modern medicines and some of them have

already abandoned using traditional medicines and prefer to use modern medicines which provides quick results. However, some of them, especially the native residents and farmers, still continue using traditional medicines and preserve this traditional healing heritage. It is necessary to strengthen and preserve the local wisdom of Atinggola community pertaining to medicinal plants.. Therefore, this ethnobotanical study of medicinal plants used by traditional healers in Atinggola Sub-district, Gorontalo, Indonesia, was conducted in order to know the local knowledge of medicinal plants, parts of the plants used as medicines and the processing of medicinal plants.

This is also to strengthen the research that has been done for other Atinggola regions, which was carried out in 2012, namely the exploration of local knowledge of ethnomedicine and community-based medicinal plants in Indonesia which reported that there were 64 plants and 48 herbs used on Atinggola. ethnic group (Kandowangko et al. 2012)

MATERIALS AND METHODS

The study was conducted in four villages, namely *Pinontoyonga*, *Ilohelumo*, *Tombulilato* and *Sigaso* of Atinggola, North Gorontalo district, Province Gorontalo,

Indonesia (Figure 1), using the survey method. Data and information collected about traditional medicinal uses of plants was done by interviews and direct observations in the field. Interviews were conducted with the traditional healers (shamans) and locals who know about or use the plants around them to treat diseases (Rahayu et al. 2002). For each plant species used as medicine, the following information was collected and recorded: local name, place of growth, parts used, method of use, and uses. The tools used in this study were: recorder, digital camera, notebooks, pens, scissors, plastic bags and questionnaires. A combination of qualitative and quantitative methods were used to collect ethnobotanical information, through in-depth interviews with respondents using open ended questionnaires. Respondents were selected using purposive sampling, based on certain criteria. Along with collection of information on medicinal plants from the community, the medicinally useful plants were collected from backyards, home gardens and forests located around the hamlet. Every plant was identified using local name and scientific name. Unidentified plants were photographed and also herbarium materials collected for further identification by botanist in the Laboratory of Botany, Department of Biology, Faculty of Mathematic and Natural Science, Gorontalo State University, Indonesia. The plants were identified using Steenis (2006). The information thus

collected were analyzed descriptively and quantitatively using tables.

RESULTS AND DISCUSSION

Results of this study indicate that 38 species of medicinal plants, belonging to 27 Genera and 20 families, are used by traditional healers in the Atinggola community (Table 1). The most widely used medicinal plants are from Euphorbiaceae, Oxalidaceae and Zingerberaceae. From each of these families, four species were found to be used as medicinal which accounts for 10.53% of the total number of species recorded as medicinal in this study (Table 2). 20 species of Medicinal plants used are trees, 8 are herbs, 3 are shrubs, 4 grasses and 5 are lianas (Figure 2).

From interviews with traditional healers of Atinggola, it was known that medicinal herbs are used not only for the treatment of relatively common and mild diseases such as ulcers, itchy skin, eye irritations, wounds and infections, but also in the treatment of severe diseases such as dengue fever, malaria, kidney stones and even cancer (table 3). Treatment for such diseases was generally demanded by the local community because of the lack of health care facilities in the accessible surroundings. There is only one simple health center located in the study area.

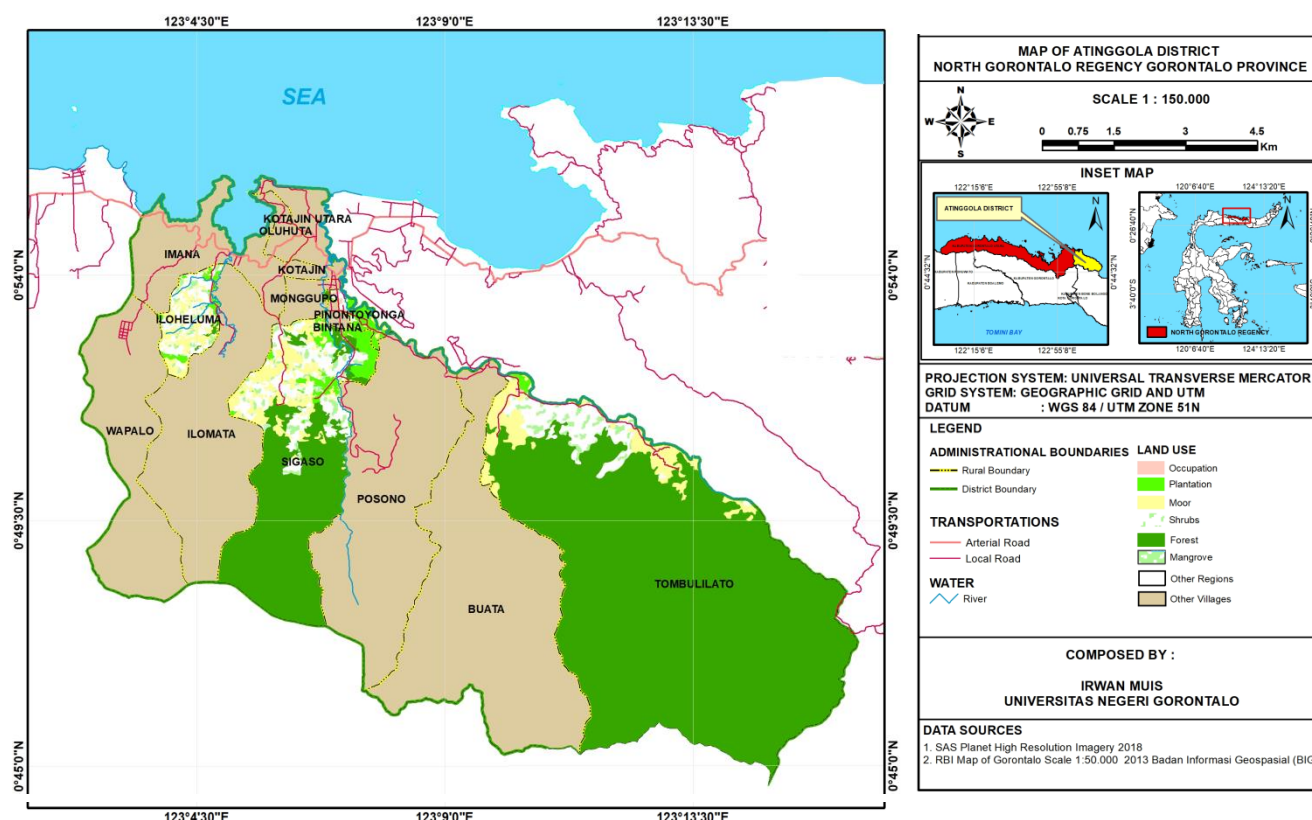


Figure 1. Location of study villages of Atinggola, District North Gorontalo, Province Gorontalo, Indonesia

Table 1. Medicinal plants used by traditional healers of Atinggola Community: Information is listed in this order-Family name, scientific name, life form, vernacular name, parts used, additional materials added, processing/method of application and health benefits/diseases treated

Family/ scientific name	Growth form	Vernacular name	Parts of plant	Additional material	Processing/Method of application	Health benefits or diseases claimed to be treated
Euphorbiaceae						
<i>Jatropha curcas</i> L.	Tree	<i>Balacae, binthalo</i> (Gorontalo)	Leaf	Coconut oil	Leaves smeared with coconut oil, heated over the fire, paste of the heated leaves applied on the forehead	Fever
			Leaf	Dried banana leaves, black coffee	Mixed with dried leaves of <i>Musa x paradisiaca</i> L. and boiled and the water decoction used for bathing and also applied on the body of of puerperal mothers. After bathing, drinking black coffee is advised to stop bleeding and increase their strength.	Energy recovery after child delivery
<i>Macaranga tanarius</i> (L.) Müll.Arg.	Tree	<i>Kayu mata putih</i> (Gorontalo, Indonesia)	Leaf		Leaves kneaded and massaged on the itchy skin	Skin Itches
			Leaf	<i>Hedyotis corymbosa</i> (L.) Lam., <i>Jatropha curcas</i> L., <i>Hibiscus tiliaceus</i> var. <i>abutiloides</i> (Willd.) Hochr.	3 pieces of each leaf mixed, boiled and the boiled water consumed.	Fever
<i>Acalypha indica</i> L.	Herb	<i>Luata</i> (Gorontalo), <i>Kucing-kucingan</i> (Indonesia)	Leaf		The leaves are crushed and placed in aching teeth cavities	Toothache
<i>Melanolepis multiglandulosa</i> (Reinw.ex Blume) Rchb.f.& Zoll.	Shrub	<i>Walongo</i> (Gorontalo); <i>Kayu kapur</i> (Indonesia)	Leaf	rhizomes of <i>Kaempferia galanga</i> L., Garlic cloves	Leaves mixed with 1 clove of garlic and rhizomes <i>Kaempferia galanga</i> L., and the water extract is dripped into the nose.	Nose breeding
Arecaceae						
<i>Cocos nucifera</i> L.	Tree	<i>Kelapa</i> (Gorontalo, Indonesia)	tender coconut meat	Leaves of <i>Curcuma longa</i> L. (leaves (Turmeric), leaves of <i>Pandanus amaryllifolius</i> Roxb. leaves, fruits of <i>Citrus limon</i> (L.) Osbeck	Tender coconut meat shredded and mixed with lemon leaves, turmeric leaf and pandan leaves. The herbal mixture is consumed three times a day	Increases breast milk
Oxalidaceae						
<i>Averrhoa carambola</i> L.	Tree	<i>Balimbi</i> (Gorontalo); <i>Belimbing manis</i> (Indonesia)	Leaf	-	Juice of the leaves taken orally, paste is applied on the itchy skin	Skin itches
			Leaf	Leaves of <i>Averrhoa bilimbi</i> , <i>dumbaya</i> (<i>Dombeya acuminatissima</i> Hochr.), turmeric, <i>bungale</i> , onion, garlic,	Mixed with leaves of <i>Averrhoa bilimbi</i> L. and one part each of dumbaya, turmeric, bungale, red onion and a clove of garlic. All the ingredients are mixed well in 150 ml of water.	Measles

<i>Averrhoa bilimbi</i> L.	Tree	<i>Lembetue</i> (Gorontalo); <i>Belimbing wuluh</i> (Indonesia)	Leaf		Juice of the leaves taken orally, paste is applied on the itching skin	Skin itches
			Flower	Fruit of (<i>Dumbaya</i>), brown sugar, leaves of <i>Coleus scutellariodes</i> (L.) Benth.	Mixed with fruits of <i>dumbaya</i> and boiled. To the water of boiled herbs, added brown sugar for taste and 7 leaves of <i>Mayana</i> . This drink is taken 3 times a day, until healed	Cough
Zingiberaceae						
<i>Zingiber purpureum</i> Roscoe.	Herb	<i>Bungale</i> (Gorontalo)	Rhizome		Rhizome pounded and massaged on the itching skin	Skin itches
			Leaf	Leaves of <i>Dumbaya</i> , leaves of <i>Molontiopo</i> , rhizome of <i>Curcuma aeruginosa</i> Roxb. clove of onion, leaves of <i>Hulotuwa</i>	7 sliced leaves mixed with 7 sliced leaves of <i>dumbaya</i> and <i>Molontiopo</i> . To this, turmeric, clove of onion and hulotuwa leaves are added and boiled well with 3 cups of water until the volume is reduced to 1 cup. Boiled water is consumed three times a day	Dengue fever
<i>Kaempferia galanga</i> L.	Herb	<i>Humopoto</i> (Gorontalo); <i>Kencur</i> (Indonesia);	Leaf		Juice of leaves consumed orally, the paste is applied on the forehead	Fever
			Leaf		Leaves boiled with water and taken directly	Cancer
Rutaceae						
<i>Euodia</i> sp.	Tree	<i>Pinogoguma</i> (Gorontalo)	Leaf		Water extract of the leaves taken directly	Fever; dengue fever
Dioscoreaceae						
<i>Dioscorea alata</i> L.	Liana	<i>Balahu</i> (Gorontalo); <i>Ubi kelapa</i> (Indonesia)	Stem		Dried stem is burnt from one end and the smoke is inhaled from the other end	Polip
Rubiaceae						
<i>Gardenia augusta</i> Merr.	Tree	<i>Pica piring putih</i> (Gorontalo); <i>Kaca piring</i> (Indonesia)	Flower		7 flowers are boiled and boiled water is taken orally	Tonic to restore body power
Arecaceae						
<i>Arenga pinnata</i> (Wurmb) Merr	Tree	<i>Waolo</i> (Gorontalo); <i>Aren</i> (Indonesia)	Midrib		Midrib which is still green peeled and the white part inside is grabbed and mashed. The paste is smeared on the wound, until the wound/ulcer dries.	Ulcers, acne scars, chickenpox.
<i>Areca catechu</i> L.	Tree	<i>Pinang</i> (Gorontalo, Indonesia)	Fruits	Leaf of walnut, fruit of <i>Citrus limon</i> (L.) Osbeck	7 pieces of ripened areca fruit is mixed with walnut leaf and lemon juice. Mixed and drunk repeatedly until healed.	Liver problems
Verbenaceae						
<i>Lantana camara</i> L.	Shrub	<i>Katumbari</i> (Gorontalo); <i>Tembelean</i> (Indonesia)	Leaf		Extracts from the leaves taken directly	High blood pressure
			Leaf		Leaves boiled and taken orally	Tuberculosis
			Flower		flowers boiled and the water consumed directly.	Gnorrhea
Solanaceae						
<i>Physalis peruviana</i> L.	Herb	<i>Bulutuhe tomete</i> (Gorontalo); <i>Ceplukan</i> (Indonesia)	Root		The roots are boiled and boiled water is consumed.	Liver problems

Gnetaceae						
<i>Gnetum gnemon</i> L.	Tree	<i>Ganemo</i> (Gorontalo) <i>Melinjo</i> (Indonesia)	Leaf		Leaves cooked and eaten like vegetables	Indigestion
Cyperaceae						
<i>Miscanthus sinensis</i> Andersson	Grass	<i>Diata</i> (Gorontalo); <i>Rumput Pisau</i> (Indonesia)	Leaf		The leaves are crushed and smeared on the head	Headache
			Flower and seed		Dried flowers and seeds mashed, brewed with hot water and drunk.	Cancer
			Fruits		7 pieces of the fruits chewed and the resulting paste is smeared on the tumor or abscess without eye, until it changes color from reddish to pale or ruptures.	Tumors or ulcers which are eyeless or not ruptured.
Menispermaceae						
<i>Arcangelisia flava</i> (L.)Merr	Liana	<i>Ayulalahe</i> (Gorontalo); <i>Kayu kuning</i> (Indonesia)	Root		the roots are boiled and the boiled water is drunk	Body fitness, tonic
			Stem	Rhizomes of ginger	The stem and ginger rhizome made into a decoction in boiling water which is drunk	Breathlessness
Caricaceae						
<i>Carica papaya</i> L.	Tree	<i>Pepaya</i>	Leaf		Yellow leaves boiled and boiled water is given to drink	Malaria
Malvaceae						
<i>Theobroma cacao</i> L.	Tree	<i>Coklat</i>	Leaf Friut		Brown leaves boiled and boiled water is given to drink Chocolate made from fruit is scraped and smeared on the wound surface	Diabetes melitus Wounds
Cucurbitaceae						
<i>Cucurbita maxima</i> Duchesne	Herb	<i>Sambiki</i> (Gorontalo) <i>Labu kuning</i>	Sap		The sap from the stem is smeared on the forehead and scalp.	Headache
Musaceae						
<i>Musa x paradisiaca</i> L.	Tree	<i>Pisang raja</i>	Fruit		Fruits consumed before meals	Ulcer
Poaceae						
<i>Bambusa affinis</i> Munro	Tree	<i>Buluh</i> (Gorontalo)	Shoots		Shredded and added salt to taste, and boiled with 3 cups of water until the volume reduces to 1 cup. Consumed orally	Diabetes melitus
Polygonaceae						
<i>Polygonum barbatum</i> L.	Herb	<i>Tolowe</i> (bahasa Atinggola); <i>Poombito</i> (Gorontalo)	Shoots		Boiled and the boiled water orally taken.	Fever
Moraceae						
<i>Ficus septica</i> Burm L.	Tree	<i>Bualo</i> (Gorontalo), <i>Awar-awar</i> (Indonesia)	Shoots		Shoots boiled and the boiled water drunk.	Poisones, allergies

Table 2. Proportion of genera and species belonging to various families used as medical plants in Atinggola, Gorontalo, Indonesia

Family	Number of genera	Proportion of total genera (%)	Number of species	Proportion of total species (%)
Euphorbiaceae	2	7.41	2	5.26
Arecaceae	3	11.11	3	7.89
Euphorbiaceae	3	11.11	4	10.53
Oxalidaceae	2	7.41	4	10.53
Zingiberaceae	2	7.41	4	10.53
Rutaceae	1	3.70	1	2.63
Dioscoreaceae	1	3.70	1	2.63
Rubiaceae	1	3.70	1	2.63
Verbenaceae	1	3.70	3	7.89
Solanaceae	1	3.70	1	2.63
Gnetaceae	1	3.70	1	2.63
Cyperaceae	1	3.70	3	7.89
Menispermaceae	1	3.70	2	5.26
Caricaceae	1	3.70	1	2.63
Malvaceae	1	3.70	2	5.26
Cucurbitaceae	1	3.70	1	2.63
Musaceae	1	3.70	1	2.63
Poaceae	1	3.70	1	2.63
Polygonaceae	1	3.70	1	2.63
Moraceae	1	3.70	1	2.63
Total	27	100	38	100

Out of the total 38 species of medicinal plants used by herbalists or traditional healers in Atinggola, number of species used in the treatment of different diseases are: 6 species to treat fever, 5 species to treat skin diseases

Table 3. Types of diseases cured with medicinal plants

Types of diseases	Name of diseases / health benefits
Mild diseases	Fever, Energy recovery post-partum, To increase breast milk, Itching skin, Toothache, Measles, Cough, Polyp's, Tonic to restore power, Ulcers, Acne scars, Chickenpox, Poisoning, Allergy, Nose bleeding, Wounds, Headache and Indigestion
Serious diseases	Cancer, High blood pressure, Tuberculosis (TBC), Gonorrhoea, Liver disorders, Diabetes mellitus, Malaria and Dengue fever

(ulcers), 2 species each to treat cancer, gastrointestinal diseases, liver diseases, and as body tonic to restore power; 1 species each to treat toothache, malaria, tonsillitis, allergies, eye irritation, wound infections, and tuberculosis (TBC). The six species used to treat fever are: *Jatropha curcas*, *Macaranga tanarius*, *Zingiber purpureum*, *Kaempferia galanga*, *Euodia redlevi*, and *Polygonum barbatum*.

In addition, there are traditional beliefs associated with the collection of plant parts for medicinal purposes. For example, while collecting plant parts from the forest plants, one cannot wear red colored shirt. Also, the herbaceous plant species should be harvested before sunrise or 06.00 pm. Water used in the processing of ingredients must be the water that has been used for cooking. The bark of the tree must be collected in the dry season, when the trunk was chipped.

Table 4. Reported medicinal uses for ethno medicinal plants of Atinggola in published literature

Family	Plant	Diseases/uses	Plant parts used	Reference
Arecaceae	<i>Cocos nucifera</i> L.	Measles	Milk from tender coconut	Lense (2012)
		Nerve system	Root	Nahdi et al. 2016
		itchy skin	Endosperm	Nahdi et al. 2016
Euphorbiaceae	<i>Macaranga tanarius</i> Muell. Arg	Chest pain, malaria	Leaves	Lense (2012)
Zingiberaceae	<i>Zingiber purpureum</i> Roxb	Body's immune system	Rhizome	Nahdi et al (2016)
Zingiberaceae	<i>Kaempferia galanga</i> L	Cough, asthma, gastrointestinal disorders, stomach ache, rheumatism, aphrodisiac, fever	Rhizome	Silalahi et al. (2015)
Arecaceae	<i>Areca catechu</i> L.	Bone Fractures, Busung, Tinuktuk tawar	Fruit	Silalahi et al. (2015)
Caricaceae	<i>Carica papaya</i> L.	Malaria	Leaves	Lense (2012)
Musaceae	<i>Musa paradisiaca</i> , L.	Easy birth	Stem	Lense (2012)
Poaceae	<i>Bambusa</i> sp.	Wounds	Outer bark	Lense (2012)
Polygonaceae	<i>Polygonum barbatum</i> L.	Scabies	Roots	Lense (2012)
		Abcesses	Leaves	Lense (2012)
		Dysentery	Leaves	Lense (2012)
Moraceae	<i>Ficus septica</i> Burm. L.	Abcesses	Bark, shoot	Lense (2012)
		Eye infection	Leaves	Lense (2012)

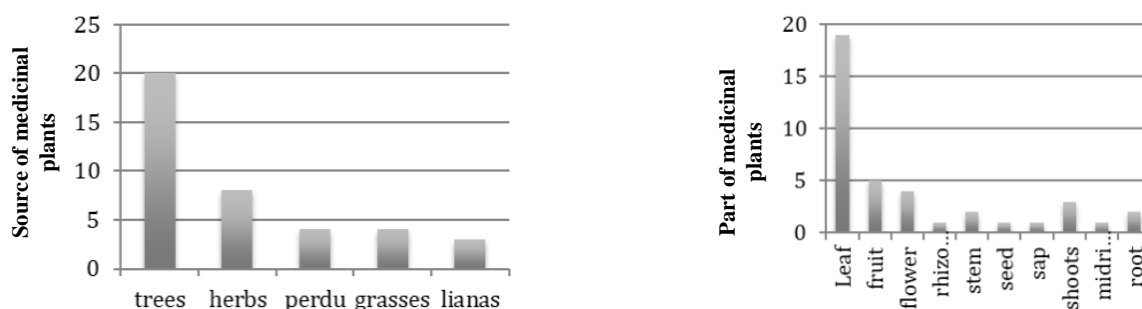


Figure 2. Proportion of medicinal plants of Atinggola based on: growth form (*left*), and part of the plants used (*right*)

A review of published literature has indicated that the medicinal plants used by the people of Atinggola have been also used by communities in other areas, either to treat the same or different diseases/purposes (table 4). For example, people of Atinggola use tender coconut (*Cocos nucifera*) meat to increase breast milk production, while it is used for treating measles in Manokwari, West Papua (Lense 2012), and Turgo community of Yogyakarta use roots of this plant to treat problems of nerve system and endosperm to treat itchy skin (Nahdi et al 2016). In both Atinggola and Manokwari of West Papua, *Carica papaya* is employed as a cure for malaria (Lense, 2012). The rhizome of *Zingiber purpureum* is used as a remedy for Itchy skin and its leaves are used for the treatment of dengue fever, in the present study. This is almost similar to the report of Nahdi et al. (2016).

Another significant finding is that people of Atinggola have a practice of planting medicinal plants in their backyards or home gardens. Data obtained during the present study regarding the source of medicinal plants indicated that 76.31% or 29 species are obtained from cultivated sources, among which 44.74% medicinal plants are collected from home gardens and 31.58% are from backyards. Only 9 species or 23.68% medicinal plants are obtained from natural forests. This proves that the people in Atinggola are aware of the necessity and importance of preserving biodiversity. Therefore, they have tried to cultivate medicinal plants that they use in their traditional medicinal systems. This stresses again on the need to document and preserve public knowledge on the use of medicinal plants as a traditional healing heritage to maintain family health and also to protect local biodiversity. Further, the community knowledge needs to be scientifically authenticated and improved through research on isolating active substances from medicinal plants, which should be carried out by scientific and academic institutions like universities. So, continuous research is needed to develop traditional knowledge both qualitatively and quantitatively which is also important to protect the local wisdom of the community as the collective intellectual property of the Indonesian people.

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*Front cover: Calf of lowland anoa (*Bubalus depressicornis*)*
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