



USE OF PLANTS AS TRADITIONAL MEDICINE IN SWAMEDICATION IN PIDIE COMMUNITIES

Hardiana^{1,2}, Saida Rasnovi^{*1} and Zumaidar¹

¹Biology Department, FMIPA Universitas Syiah Kuala Darussalam - Banda Aceh

²Pharmaceutical and food Analysts Academy Banda Aceh

*Corresponding Author E-mail : saida_rasnovi@unsyiah.ac.id

Abstrak. Self-medication is an act of self-healing using plants as traditional and modern medicine without the intervention of professional medical personnel. Availability of natural materials and affordable prices encourage people to return to using traditional medicines. The purpose of this study is to find out the types of plants used by the community Pidie, plant parts and reasons for using plants as traditional medicine in self-medication. The type of research used is non-experimental with the survey method and PRA (Participatory Rural Appraisal), by interviewing 1280 respondents. Parameters of this study are the types of plants used, plant parts and reasons for using plants as traditional medicine in self-medication. The results showed that there were 38 tribes and 53 types of plants. The most widely used plant parts were leaves (44.3%), the least were roots (0.7%), and the reason for using plants as traditional medicine in self-medication was easily obtained (53.8%).

Keywords: Health care, plants, traditional medicine, Pidie community, PRA

I INTRODUCTION

The use of plants in self-medication as traditional medicine is a manifestation of the community's active participation in solving health problems and has been recognized by various nations in improving public health [1]. The efforts of Self-medication with traditional medicine are the form of community participation and the potential technology to support the health development sector at the same time. Basically, if it is done rationally, self-medication provides a big advantage for the government in national health maintenance [2]. In order to get the self-medication secure, rational, effective and affordable for the community, it is necessary to increase knowledge and practice skills in self-medication practices. There is some minimal knowledge that should be understood by the community because it is important in self-medication. Such knowledge includes identifying symptoms of the disease, choosing products according to indications of disease, following the instructions listed on brochure etiquette, monitoring the results of therapy and the possibility of side effects [2]. Knowledge of medicinal plants is based on hereditary experiences and skills that have been inherited which are deeply rooted in national culture and their use as drugs is also increasingly diverse [3,4].

A total of 283 plants species have been registered for the use of traditional medicines or herbs, 180 of which are plants drugs that are still taken from the forest, only 13 of the 283 types of medicinal plants that have been cultivated are ginger, galangal, *kencur*, turmeric, *lempuyang*, *temu lawak*, *temu ireng*, vile shard, dringo, cardamom, locking, noni and sambiloto [5]. The tendency of people to return to nature is increasing so that the use of natural materials, including treatment with plants which are efficacious as medicines, is also increasing to overcome health problems. Some research results have suggested several reasons why people do self-medication using traditional medicine. The reason is in the form of a mild, cost-effective and temporary illness, namely as the first countermeasure [6]. Based on the results of the study [7], several medicinal plants have been utilized by the community Pidie Regency as self-medication has been scientifically proven to have efficacy as an anti-bacterial, and the results of the study [8], namely doing treatment by utilizing several medicinal plants for skin diseases self-medication in the people of Pidie Regency. One area that has the potential to have a diversity of medicinal plants in Aceh

Province is Pidie District. This is indicated by people who still use plants as traditional medicines. Therefore, the use of plants as traditional medicine through self-medication is an important thing to review. Information about traditional medicines that have been used for decades by the Pidie community in particular can be used as accurate information, so that it can help the Ministry of Health and preliminary studies for pharmaceutical researchers in developing medicines based on natural medicine ingredients.

II METHODOLOGY

The type of research used is non experimental with survey methods and Participatory Rural Appraisal (PRA) methods. Data obtained directly from respondents, then will be analyzed descriptively and tabulated in the form of tables and images. The population in this study was the people of Pidie District, with a sampling intensity of 30% at the District and village/village levels. The number of sub-districts in Pidie district surveyed is 8 subdistricts. The selection of eight sub-districts was carried out by using the stratified sampling method and divide Pidie district into two regions, namely: urban areas and rural areas. In each selected sub-district, 30% of the total villages are surveyed. For each village, there were 20 peoples in the respondents' data according to the group of respondents who had been determined.

III RESULTS AND DISCUSSION

The results of the study involving a total of 1280 respondents gave information to treat various diseases faced by the people of Pidie Regency, there were recorded 38 tribes from plants and 53 types of medicinal plants. The types of plants that are widely used as medicines by the people of Pidie Regency are mainly from the *Ziberberace* tribe (Table 1). The types of medicinal plants used by the people of Pidie Regency are mostly plants that are around their home environment. The *Zingiberaceae* tribe is the most widely known type compared to other tribes. There are five types of plants from the *Zingiberaceae* tribe used for self-medication by the Pidie District Community. Most of the respondents knew well the plants of the *Zingiberaceae* tribe because in general these plants are often used for cooking spices, and some of them are planted around their homes like in the yard. The most widely known types of benefits by respondents were turmeric (*Curcuma domestica Val.*), which is to treat stomach, hives, medication wounds, abdominal pain, and headaches disease [9]. Turmeric is also used to increase appetite, and facilitate labor, blood smoothing, freshening after giving birth, swelling of the body due to insect bites, and exposure to caterpillars.

The survey results of this study found that turmeric (*Curcumadomestica Val.*) had the highest used in 121 respondents of the Pidie Society (equivalent to 14.1%). This proved that respondents' knowledge about the benefits of turmeric from Pidie is very high in traditional medicine. The chemicals contain the function for diseases caused by bacteria or viruses and decreased immunity or endurance. Turmeric contains curcumin which in addition to giving the color yellow is also an anti-bacterial substance [10].

Respondents' knowledge about the use of turmeric as a medicine is mostly obtained from generation to generation. Knowledge of the medicinal properties of a plant species and its use as medicine is obtained by the local community only by seeing or hearing from parents from generation to generation and from the experience of others around them [11]. The Pidie community also knows the types of ginger plants because they are often used to cure various diseases [12]. Ginger (*Zingiber officinale*) Rosc. is one of the herbs and medicine that has long been known to the public. Ginger rhizomes contain chemicals, namely essential oils, flavonoids and polyphenols. These active compounds contain phenol that are commonly used as drugs for several diseases, such as respiratory problems, fever, runny nose, cough, and stomachache. Ginger can also be used as a remedy for rheumatism, headaches, cough medicines, and diarrhea [13,11].

Curcuma xanthorrhiza Roxb is a traditional medicine that is also often used by the Pidie community. *Curcuma* has long been known and used for health care, prevention and treatment of diseases. Based on its active content, ginger can improve digestive function, maintain liver function, relieve joint and bone pain, reduce blood fat and inhibit blood collection [14]. Temulawak is a spice plant that has benefits for increasing appetite and as antikolestrol, anti-inflammatory, antianemia, and antioxidants. Kurkuminoid as the main substance which is yellow, in ginger it is known to have many health benefits. The compound content of curcumin causes curcuma to be effective for treatment [15,16]. Curcumin can inhibit cancer cell growth [17]. *Curcuma* also contains phytochemical compounds that have a good effect on health, including alkaloids, flavonoids,

Table 1 Types of plants used self-medication for traditional medicine in the Pidie community.

Title	Type	Indonesian name	Section used	Usability
Zingiberaceae	<i>Curcuma domestika</i> L.	Kunyit.		Gastric pain, wounds, and appetite enhancer
	<i>Curcuma Zanthorrhiza</i> L.	Temulawak		Liver function, digestion, and appetite
	<i>Zingiber officinale</i> Rose	Jahe	Rhizome	Coughing, headaches, colds, and nausea
	<i>Alpinia galanga</i> L.	Lengkuas		Medication for diarrhea, asthma and sore throat
Euphorbiaceae	<i>Kaempferia galanga</i> L.	Kencur		Cough, diarrhea
	<i>Jatropha curcas</i> L.	Jarak pagar	Sap	Tooth ache
	<i>Jatropha multifida</i> L.	Jarak cina		New wound
	<i>Manihot esculenta</i>	Ubi kayu	Leaf	Hot fever
Fabaceae	<i>Phyllanthus niruri</i> L.	Meniran		Pain, inflammation
	<i>Parkia speciosa</i> L.	Petai		Hypertension, digestion
	<i>Leucaena leucocephala</i> L.	Lamtoro	Leaf	To treat intestinal worms, bruises, and menstruation
	<i>Adenantha pavonina</i> L.	Saga		Cough
Asteraceae	<i>Samanea saman</i> Merr	Trambesi		Hot fever
	<i>Eclipta alba</i> H.	Urang aring		Skin diseases, hypertension, vaginal discharge, and fever
	<i>Tagetes erecta</i> L.	Tahi ayam	Leaf	Headache, stomach, teeth.
	<i>Chromolaena odorata</i>	Kopasanda		Stomach, new wounds
Myrtaceae	<i>Psidium guajava</i> L.	Jambu biji	Leaf	Diarrhea
	<i>Eugenia polyantha</i> L.	Salam		Cholesterol, gout
	<i>Eugenia cumini</i> L.	Jamblang	Bark	Cholesterol, gout
Achantaceae	<i>Andrographis paniculata</i>	Sambiloto	Leaf	Treat flu, heat fever, and diabetes
	<i>Strobilanthes crispera</i> L.	Keji beling		Lumbago, coral
Anacardiaceae	<i>Lannea grandis</i> L.	Kedondong pagar	Leaf	Stomach ache
Annonaceae	<i>Annona muricata</i> L.	Sirsak	Leaf	Cough
Amaranthaceae	<i>Beta vulgaris</i> L.	Buah bit	Fruit	Blood HB
Apiaceae	<i>Centela asiatica</i>	Pegagan	Leaf	Burns, blood circulation, and hypertension
	<i>Apium graviolens</i> L.	Seledri		Relieves rheumatism, and gout
Apocynaceae	<i>Catharanthus roseus</i> L.	Tapak dara	Flower	Diabetes, hypertension, leukemia, and new wounds
Araceae	<i>Typhonium flagelliforme</i> L.	Keladi tikus	Bulbs	Mumps, cyst cancer
Arecaceae	<i>Areca catechu</i> L.	Pineng nyen	Fruit	Stomach ache, head, bruising.
	<i>Cocos nicifera</i> L.	Kelapa		Headache, dizziness
Basellaceae	<i>Anredera cordifolia</i> (Ten.) Steenis	Binahong	Leaf	Stomach ache
Bromeliaceae	<i>Ananas comosus</i> L.	Nenas	Fruit	Coral reef,
Caricaceae	<i>Carica papaya</i> L.	Pepaya	Leaf	Malaria
Clusiaceae	<i>Garcinia mangostana</i> L.	Manggis	Fruit	Diabetes, hypertension, cholesterol.
Cucurbitaceae	<i>Cucumis sativus</i> L.	Mentimun		Hypertension
	<i>Cucurbita moschata</i> L.	Labu kuning	Fruit	Hypertension, digestion and bone
Crassulaceae	<i>Bryophyllum pinnatum</i> L.	Daun cocor bebek	Leaf	Toothache, headache, dizziness
Gnetaceae	<i>Gnetum gnemon</i> L.	Melinjo	Fruit	Boils
Lamiaceae	<i>Orthosiphon spicatus</i> (B.) Bs	Kumis kucing	Leaf	Urination, rheumatism and colds
	<i>Persea americana</i> L.	Alpukat	Fruit	Hypertension, overcoming dry facial skin
Lauraceae	<i>Cinnamomum verum</i> L.	Kayu manis	Bulbs	Blood sugar, cholesterol, and rheumatic pain
Loranthaceae	<i>Macrosolen cochinchinensis</i> L.	Benalu kopi	Leaf	Neck cancer, breast cancer
Lthraceae	<i>Lawsonia inermis</i> L.	Pacar kuku	Leaf	Stomach ache

Title	Type	Indonesian name	Section used	Usability
Meliaceae	<i>Lansium domesticum</i> L.	Langsat	Leaf	Malaria
Moringaceae	<i>Moringa oleifera</i> Lam	Kelor	Leaf	Uric acid
Moraceae	<i>Artocarpus comunis</i> Merr.	Sukun	Leaf	Cholesterol levels, heart disease, and gout
Musaceae	<i>Musa paradisiaca</i> L.	Pisang awak	Fruit	Digestion, constipation and ulcer
Oxalidaceae	<i>Averrhoa carambola</i> L.	Belimbing manis	Fruit and leaves	Reduce hypertension
	<i>Averrhoa bilimbi</i> L.	Blimbing sayur	Fruit	Relieves cough, muscle aches, and rheumatism
Pandanaceae	<i>Pandanus amarylli folius</i> L.	Pandan	Leaf	Symptoms of rheumatism, insomnia, and menstruation
Portulakaceae	<i>Talinum triangulare</i> Prees	Ginseng	Leaf	Blood circulation, and maintaining healthy liver
	<i>Piper bettle</i> L.	Sirih	Leaf	Gastric ulcers, bleeding gums, and abdominal pain
Piperaceae	<i>Piper nigrum</i> L	Lada/merica	Seed	Headache, teeth
Poaceae /Gramineae	<i>Cymbopogon nardus</i> L.	Serai	Stem	Cold, blood sugar, skin health.
Rubiaceae	<i>Morinda citrifolia</i> (L.) Merr.)	Mengkudu	Fruit	Lower cholesterol, blood sugar and fever
Rutaceae	<i>Citrus aurantium</i> Swingle	Jeruk nipis	Fruit	Cough
	<i>Murraya koenigii</i> L.	Daun kari	Leaf	Diabetes, ulcer and anemia
Rosaceae	<i>Malus domestica</i>	Apel	Fruit	Heart health, cancer and asthma.
Simarubaceae	<i>Eurycoma longifolia</i> Jack.	Pasak bumi	Leaf	Malaria
Solanaceae	<i>Solanum lycopersicum</i> L.	Tomat	Fruit	Eyes, heart, and prevent kidney stone

phenolics, saponins, and triterpenoids. Curcuma is also used in medicine, as a natural dye in food [18]. The second most widely known type by the Pidie community is from the *Euphorbiaceae* group which was used as self-medication by respondents. Some species from the *Euphorbiaceae* tribe such as *Jatropha curcas* L. are very easy to obtain because they are often used as fences for residents. Pidie people use sap from castor trees to be used to treat toothache. The active substances found in the *Jatropha* are flavonoids, saponins, and tannins. *Jatropha* sap contains flavonoids that can function as antifungi, antiseptics, and anti-inflammatories, also contain saponins which can stimulate collagen growth in the healing process and also have the effect of relieving pain and stimulating the formation of new cells. Distance sap also contains tannin (18%) which functions as a mouthwash and bleeding gums and wound medicine [19].

Jatropha sap is effective in inhibiting the growth of *Streptococcus mutans* bacteria. This inhibitory force is strongly influenced by the presence of antibacterial substances contained in the sap of distance. Distance sap is used as a medicine for toothache by dripping one or two drops of sap into a tooth hole [20]. Chinese Distance Tree (*Jatropha multifida* L.), which is an ornamental plant, usually used to treat new

wounds. They know this plant as the tub of betadine because the sap is yellowish red and generally the sap of this plant is dripped to treat new wounds. Leaves from betadine have laxative power. Chinese distance contains alkaloids, saponins, flavonoids, and tannins. Other types of plants that often used are cassava (*Manihot esculenta* L.), leaves of cassava are commonly used to reduce heat from the leaves by means of leaves. Squeezed and the water is applied to the entire body, but some of the others are wild plants that have not been cultivated such as meniran (*Phyllanthus niruri* L.). In general, respondents also recognize the plant species of the *Asteraceae* tribe, because it is very easy to find and grow wild around their homes, such as along the river, alongside roads and bushes. *Eupatorium* Sp (kopasanda) is also widely used by the community as medicine self-medication. This type of plant is known by most respondents, generally growing wild on the banks of rivers and neglected empty lands. This plant is known as *seurapoh athe*. The part that is often used is leaves that are kneaded or pounded to treat new wounds, the brew of the roots can cure leucorrhoea. Green shoots or squeezed leaves, wrapped with whole leaves and then put in hot ash, and then the juice from the ingredients is used to treat wounds and ulcers.

One type of plant from the *Myrtaceae*, which is cultivated by most respondents, namely guava (*Psidium guajava* L.) fruit and leaves from guava after boiling and brewing, can to treat diarrhea. It is associated with some secondary metabolite content in the leaves of *Psidium guajava* L. [21]. Active ingredients include tannins, flavonoids, guayaverin, leukocyanidin, essential oils, malic acid, amber, and oxalic acid, but only special components such as flavonoids, tannins, essential oils, and alkaloids that have pharmacological effects as antidiarrheal, especially in diarrhea caused by bacteria [22,23,24]. Based on the research conducted by John, one of the active ingredients contained in the leaves of *Psidium guajava* L. which has the most effective role as anti-diarrheal is flavonoids. The flavonoid derivative contained in the leaves of *Psidium guajava* L. is *quercetin* [22,23,25]. *Quercetin* compounds have the potential as antidiarrheal agents by inhibiting the release of acetylcholine which can increase intestinal contractions due to irritation by bacteria that cause diarrhea. Jamblang (*Eugenia cumini* L.), Jamblang fruit has a mature and ungujic-colored acidic taste [26,27], which is sold after cooking. All parts of this plant are used for medicinal purposes. Stems, leaves and fruits of jamblang plants have activities as antioxidants, anti-inflammatory, worm medicine, anticancer, antibacterial and antidiabetic [28]. Activity as an antioxidant is thought to be due to the presence of flavonoids and polyphenols in these plants [29]. While from other types such as Salam (*Eugenia polyantha* L.), they usually grow wild in the bush. Some respondents used the stew from bay leaves to treat stomach pain. Bay leaves contain a variety of active compounds such as flavonoids that can prevent oxidation of *Low density Lipoprotein* (LDL) and prevent the deposition of fat in blood vessel walls. In addition to flavonoids, bay leaves also contain saponins which function to prevent absorption of fat, increase excretion in the urine so that fat is not buried. This effect has been proven in the study of male hyperlipidemia white rats. The types of plants used are different for each type of disease, although there is also a combination of several herbs mixed to become one particular disease drug. The Pidie community has excellent knowledge in selecting medicinal plants that are suitable for the type of disease suffered.

The plant parts used as medicine by the Pidie Society are leaves, stems, flowers, seeds, fruit, roots, rhizomes, sap, bark and all parts [30]. However, there are also other types of plants

which almost all parts of the plant can be used for self-medication.

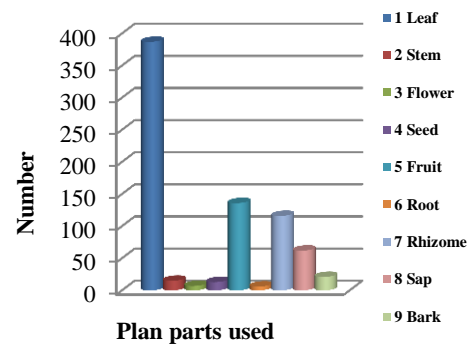


Figure 1 Parts of the plants used by the Pidie community for self-medication

The results of the survey of Pidie community respondents obtained that the highest percentage of plant parts used were leaves, that is (44.3%), and the lowest was the root ie (0.7%). Only a small percentage of respondents used plant parts such as stems, rhizomes, flowers, seeds, fruit, sap, and bark for self-medicinal treatment with traditional medicines. Likewise with the identification and utilization of medicinal plants of the Dani tribe in Jayawijaya Regency, Papua, the most widely used part is leaves [31]. The use of leaves for medicinal ingredients is carried out at most compared to other parts of plants.

Leaves are part of the plant most widely used in self-medication by the Pidie Society, because the leaves accumulate a lot of secondary metabolites which are useful as drugs, such as tannins, alkaloids, essential oils and other organic compounds stored in vacuoles or on additional tissue in leaves such as trichome [32]. The high frequency of use of leaf parts as medicinal ingredients appears to be related to several advantages such as the number or productivity of leaves that are easier to obtain compared to other parts and its use is relatively easier because can be used directly. The reason for the Pidie Society to use plants as traditional medicine is because they believe that traditional medicines have relatively fewer side effects. The results of the survey of Pidie Community respondents found that the highest percentage reason was easily obtained (53.8%), and the lowest did not need to use prescriptions (2.7%). This is related because many types of plants are available in the neighborhood. Require can take directly without having to buy. In addition, the driving factors for the increase in the use of traditional medicines in the Pidie community are the longer life expectancy when the prevalence of chronic diseases increases, the failure of the use of

modern drugs for certain diseases including cancer, and the wider access to information about traditional medicines throughout the world. Traditional medicines in the form of TOGA are considered safer because of natural ingredients can be obtained easily, and prices are relatively affordable [33].

CONCLUSION

The types of plants used by the Pidie District community are mostly found around their living environment. A total of 38 tribes and 53 types of plants are known by the Pidie community, the most widely known tribe of plants is *Zingiberaceae* as many as 5 types of plants, followed by the tribe *Ephorbiaceae* and *Fabaceae* each of 4 species, and *Asteraceae* as many as 3 types of medicinal plants. The most widely used part of the plant is leaves, the lowest is the root. The reason for using plants as the highest medicinal traditional medicine is it can be obtained easily, and the low one does not need to use recipes.

ACKNOWLEDGMENT

Thank you to all the people of Pidie District, especially to the Peukan Baro, Indrajaya, Mutiara, Keumala, Glumpang Tiga, Sigli, Mila, and Tiro Districts, for their assistance and cooperation during the research. Pidie District Central Bureau of Statistics in collaboration with the Pidie District Bappeda which has been petrified in providing data on the population in Pidie District.

REFERENCE

1. Nurwidodo. 2003. *Pencegahan dan Promosi kesehatan Secara Tradisional Untuk Peningkatan Status Masyarakat di Sumenep Madura*. Malang. Jurusan Biologi. Fakultas Keguruan dan Ilmu Pendidikan UMM
2. Depkes R.I., 2008. *Profil Kesehatan Indonesia*. Jakarta.
3. Sari, L. O. R. K. 2006. Pemanfaatan Obat Tradisional dengan Pertimbangan Manfaat dan Keamanannya. *Majalah Ilmu Kefarmasian*. 3 (1) : 1-7.
4. Zuhud, E. A., Ekarelawan, M. dan Ridwan S. 1994. *Hutan Tropika Indonesia sebagai sumber keanekaragaman plasma nutfah tumbuhan obat*. *Pelestarian Pemanfaatan Keanekaragaman Tumbuhan Obat Hutan Tropika Indonesia*. Bogor. Kerjasama Jurusan Konservasi Sumberdaya Hutan, Fakultas Kehutanan IPB dan Lembaga Alam Tropika Indonesia.
5. Badan POM, 2006. *Pedoman Cara Pembuatan Obat yang Baik*. BPOM Jakarta.
6. Supardi, S dan Notosisworo. 2005. Pengobatan Sendiri Sakit Kepala, Demam, Batuk dan Pilek pada Masyarakat di Desa Ciwalen, Kecamatan Warungkondang, Kabupaten Cianjur, Jawa Barat, *Majalah Ilmu Kefarmasian*, Vol II. (3): 134-144
7. Zumaidar, dan Nursanty, R. 2011. Potensi Anti Bakteri Beberapa Tumbuhan Obat Tradisional. *Jurnal Biologi Edukasi*. Vol 2 (3): 1-5 Jurusan Biologi FMIPA Unsyiah Darussalam Banda Aceh.
8. Rubiah, Djufri dan Muhibbuddin. 2015. Kajian Etnobotani Tumbuhan Obat Penyakit Kulit pada Masyarakat Kabupaten Pidie. *Jurnal Biologi Edukasi Edisi 14*. Vol.7 (1): 34-41. Barat, *Majalah Ilmu Kefarmasian*, Vol II. (3): 134-144.
9. Ashari, 1995. *Hortikultura Aspek Budidaya*. Buku. Penerbit Universitas Indonesia. Jakarta. 141-146
10. Winarto, I.W. 2004. *Khasiat dan Manfaat Kunyit*. Jakarta: AgroMedia Pustaka. pp 2 - 12.
11. Sastroamidjojo, S. 2001. *Obat Asli Indonesia*. Dian Rakyat. Jakarta.
12. Hariyadi, B. (2011). Obat Rajo Obat Ditawar: Tumbuhan Obat dan Pengobatan Tradisional Masyarakat Serampas-Jambi. *Jurnal Biospecies*. 4 (2): 29 -34.
13. Astuti, V. 2000. Uji antibakteri ekstrak jahe (*Zingiber officinale* Rosc) terhadap pertumbuhan bakteri *Escherichia* dan *Staphylococcus aureus* Secara In Vitro. Universitas Diponegoro Semarang.
14. Badan POM. 2005. Peraturan Kepala Badan Pengawas Obat dan Makanan RI No.HK.00. 05. 4. 1380 tentang Pedoman Cara Pembuatan Obat Tradisional yang baik. BPOM, RI, Jakarta
15. Taryono, E. M. Rahmat, S dan Sardina, A. 1987. *Plasma Nutfah Tanaman Temu-temuan*. Edisi Khusus Ballitro. 3 (1) ;47-56.
16. Khaerana, M., Ghulamahdi, dan Purwakusumah, E. D. 2008. Pengaruh cekaman kekeringan dan umur panen terhadap pertumbuhan kandungan xantorrhizol temulawak (*Curcuma xanthorrhiza* Roxb.)uletin *Agronomi* 36(3): 241-247.
17. Choi, H. K., Yang, J. W., Roh, S. H., et al. 2007. Induction of Multidrug Resistance Associated Protein 2 in Tamoxifen-Resistant Breast Cancer Cells. *Endocrine Related Cancer*, 14, 93-303

18. Liang, O.B., Widjaja, Y., dan Puspa S., 1985. Beberapa Aspek Isolasi, Identifikasi, dan penggunaan Komponen – komponen *Curcuma Xanthorrhiza* Roxb dan *Curcuma Domestica* Val, *Proseding Simposium Nasional Temulawak*. Lembaga Penelitian Universitas Padjajaran, Bandung, Hal 85-92.
19. Direktorat Jenderal Perkebunan (Ditjenbun), 2007. *Pedoman budidaya tanaman jarak pagar*. Pusat Penelitian dan Pengembangan Perkebunan. Bogor.
20. Irmaleny, S. N., Dewi, F. dan Marline, A. 2010. *Dosis efektif getah jarak pagar (Jatropha curcas L.) sebagai analgesik dengan menggunakan tes geliat*. Universitas Hasanuddin. Makassar.
21. Tannaz, J. B., Brijesh, S. dan Poonam, G. D. 2014. Bactericidal effect of selected antidiarrhoeal medicinal plants on intracellular heat-stable enterotoxin-producing *Escherichia coli*. *Indian Journal of Pharmaceutical Sciences*. 76 (3): 229-235.
22. Ajizah, A. 2004. Sensitivitas Salmonella typhimurium terhadap ekstrak daun *Psidium guajava* L. *Bioscientiae*. 1(1): 31-8.
23. Ojewole, J .A. 2006. Antiinflammatory and analgesic effects of *Psidium guajava* L. (*Myrtaceae*) leaf aqueous extract in rats and mice. *Methods and findings in experimental and clinical pharmacology*. 28 (7): 441-446.
24. Biswas, B., Rogers, K., McLaughlin, F., Daniels, D. dan Yadaf, A. 2013. Antimicrobial activities of leaf extracts of guava (*Psidium guajava* L.) on two gram-negative and gram-positive bacteria. *International Journal of Microbiology*. Vol. 4 (1): 113-118.
25. John, A. O. O., Emmanuel, O. A. dan Witness, D. H. C. 2008. Antidiarrhoeal activity of *Psidium guajava* L. (*Myrtaceae*) leaf aqueous extract in rodents. *Journal Smooth Muscle Res*. 44 (6): 195-207.
26. Dalimartha dan Setiawan. 2003. *Atlas Tumbuhan Obat* Jilid 3. Jakarta: Pustaka Swara.
27. Depkes RI, 1995, *Farmakope Indonesia*, Edisi IV, 112, Departemen Kesehatan Republik Indonesia, Jakarta.
28. Haroon, R., Jelani, S., Arshad, F.K. 2015. Comparative analysis of antioxidant profiles of bark, leaves and seeds of *Syzygium cumini* (Indian blackberry). Vol 3. *IJRG*.
29. Shankara, R. 2014. Antioxidant activity of *Syzygium cumini* leaf gall extracts. *BioImpacts*. 4(2).101-107.
30. Mursito, 2004. Uji Efektifitas Dekok Bunga Belimbing Wuluh (*Averrhoa Bilimbi*) Sebagai Antimikroba Terhadap Bakteri *Salmonella Typhi* Secara In Vitro. *Jurnal Kedokteran Brawijaya*, 20 (1), 30-34.
31. Yuliana, M., Simbala, H., dan Koneri, R. 2016. Identifikasi dan pemanfaatan tumbuhan obat suku Dani di Kabupaten Jayawijaya Papua Jurusan Biol ogi, FMIPA, Unsrat, Manado *Jurnal MIPA UNSRAT online* 5 (2) 103–107
32. Haryanti, S. 2010. Jumlah dan Distribusi Stomata pada Daun beberapa Spesies Tanaman Dikotil dan Monokotil. *Jurnal Buletin Anatomi dan Fisiologi*. 18(2): 20-28.
33. Widayati, A. 2013. Swamedikasi di Kalangan Masyarakat Perkotaan di Kota Yogyakarta. *Jurnal Farmasi Klinik Indonesia*. Volume 2 (4):145-152.