Ethnomedicin Studies and Antimicrobial Activity Tests of Plants Used in The Tengger Tribal Community

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***Abstract*—Based on the medicinal plants used by the Tengger tribe and their vulnerability to antibiotic resistance, it is necessary to develop new antimicrobial drugs that are sourced from natural ingredients. This study is to determine the use of plants as a traditional medicine in the Tengger tribe which has the potential as an antimicrobial.**

Determination of informants in the Tengger Tribe with *snowball sampling*. Antimicrobial plants that have UV and ICF values close to 1 macerated with 96% ethanol. Ethanol extract, water fraction, ethyl acetate fraction and n-hexane fraction were made at concentrations of 40, 20, 10, 5, and 2.5%. Antimicrobial test by dilution method, each concentration was tested on *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Salmonella typhi*, and *Candida albicans*.

The results showed 31 types of disease, 47 medicinal plants and 60 traditional ingredients in the Tengger tribe. Based on UV and ICF values 9 types of antimicrobial diseases and 4 potential medicinal plants were obtained. Antimicrobial medicinal plants used are *Radicula armoracia*, *Artemisia vulgaris*, *Prunus persia*, and *Rapanus raphanistrum*. Antimicrobial activity is best shown in the fraction n-hexane in all test plants. The four medicinal plants used by the Tengger tribe have the potential to be new antimicrobials

Keywords— ethnomedicin, tengger tribe, antimicrobials

I. INTRODUCTION

Drug resistance causes fewer drug choices that can be used to treat infections. The more often the antibiotic is used, the faster the resistance arises. Infections that used to be handled easily, but because the usual antibiotics can no longer handle it, the infection becomes difficult to treat. The vulnerability of antibiotic resistance and the soaring price of synthetic drugs, increasing the reuse of traditional medicines by medical staff and the community [11]. Traditional medicine has been used by some people for generations and until now many have been proven scientifically efficacious drugs.

Traditional medicine in Indonesia has been done since ancient times, as evidenced by the presence of *serat centini* in primbon jawa [15]. Primbon Jawa revealed that the Tengger Tribe people do various uses of plants as healing diseases. One example is when someone is sick or about to give birth, pangulu treats by giving holy water from Mount Brama. The diseased body was then swabbed with the holy water and made it heal thanks to the power of Hyang Bathara. According to [3] and [6], the tradition of traditional medicine in the Tengger Tribe community is still maintained until now, demonstrated by the many recipes of traditional medicine and medicinal plants used.

The Tengger tribe is included in the mountainous area of the Bromo Tengger Semeru National Park (TNBTS) which has been designated as a national park area since October 1982 based on the Decree of the Minister of Agriculture No. 736 / Mentan / X / 1982. Topographical conditions vary from bumpy with gentle slopes to hilly and even mountainous with upright slope degrees with an average rainfall of 6,604 mm / year and have submontane and sub-alpine ecosystem types with large, tall trees aged hundreds of years [4]. This area is designated as a national park because it has the potential for natural wealth that is not only large but also unique. The conservation area has a high biodiversity with typical vegetation characteristics of wet highlands such as edelweiss (*Anaphalis javanica*), *Cemara gunung* (*Casuarina junghuhniana*.) And Adas (*Foeniculum vulgare*). Likewise with some rare species of medicinal plants that can still be found in this region such as sintok (*Cinnamomum sintoc*), purwaceng (*Pimpinella pruatjan*), pronojiwo (*Euchresta horsfieldii*) and pulosari (*Alyxia reinwardtii*) [6].

Varied natural conditions and biodiversity cause the use of medicinal plants to be very high in the Tengger Tribe community. stated that 118 types of medicinal plants are potential to be used to cure 60 disease symptoms in the Tengger community such as dringu *(Acorus calamus*) used as asthma and cough medicines, Adas (*Foeniculum vulgare*) as a heat and pain medication, garlic (Allium sativum) cold medicine and flatulence, mountain amethyst bud (*Brugmansia candida*) eye pain medication, jambu wer (*Prunus persica*) for diarrhea medication [3]. Diseases that can be treated with medicinal plants in the Tengger Tribe are categorized as cardiovascular disease, eye disease, digestive diseases, respiratory diseases, urinary tract diseases, neurological disorders, bone and joint diseases, infectious diseases, and other diseases. In his report [3] infectious diseases that often exist and can be treated from traditional recipes of the Tengger Tribe among them: coughing, diarrhea, ulcers, ulcers, syphilis, and typhus.

Based on the number of medicinal plants that have been used by the Tengger Tribe community and the susceptibility of antibiotic resistance, it is necessary to develop new antimicrobial drugs that are sourced from natural ingredients. Ethnomedicine is a science that can be used to get new drugs [11]. Ethnomedicine is a combination of scientific disciplines that study the relationship between cultural habits in a group of people in terms of pharmacy[14].

In the study of antimicrobial activity in Ethnomedicine plants used by the Tengger tribe, pharmaceutically prepared studies (*ethnopharmacetics*), claimed effects (*ethnopharmacology*) include digestive diseases, respiratory diseases, urinary tract diseases, infectious diseases, and other diseases caused by microorganisms, and antimicrobial

testing of potential plants that have been used by the Tengger tribe. Test bacteria in this study include *Staphylococcus aureus* ATCC 2592, *Bacillus subtilis* ATCC 6633, *Pseudomonas aeruginosa* ATCC 27853, *Salmonella typhi* ATCC 13311, and *Candida albicans* ATCC 10231.

II. METHOD

This research is a descriptive study that uses qualitative and quantitative methods. Qualitative methods are used to determine the use of plants, animals, and minerals that are known and used by the Tengger Tribe as a drug, while the quantitative method is used to determine the antimicrobial activity of plants known and used by the Tengger Tribe as a drug [16].

A. Survey Ethnomedicin

Information gathering is obtained through *semi-structured* interviews with informants who know and use plants as medicine [14], using the type of *open-ended* questions [13]. To determine the informants who know the use of plants in this study the *Snowball Sampling* method was used. In the sampling method, it starts with a small group that is asked to show each other friends. Then the friends were asked to also show each other, and so on so that the group grew like a snowball which grew larger when sliding from the top down [13].

The plants used by the Tengger tribe as a drug based on the results of an ethnomedicine study were carried out in MMB Batu Malang and comparative studies with medicinal plant research conducted by batoro [3]. Furthermore, researchers used samples taken from plants that had the value of the Informant Concentus Factor and the best Use Value with a value close to 1 to test antimicrobial activity.

B. Extraction

Sample extraction of each plant that has the best ICF and UV values. A 300-gram dry sample was put into a maceration vessel and immersed in a 96% ethanol 96% liquid (1:10), stored at room temperature for 3 days while occasionally stirring and then filtered. The pulp obtained is then extracted again. The ethanol extract obtained was then combined and filtered using Whatman No.1 paper and the filtrate obtained was then concentrated using an evaporator at a temperature below 45 ° C until a thick extract was obtained.

C. Antimicrobial screening

Concentrations of 40%, 20%, 10%, 5%, 2.5% extracts and water fractions, ethyl acetate and n-hexane of medicinal plants and negative controls were *Staphylococcus aureus* ATCC 2592, *Bacillus subtilis* ATCC 6633, *Pseudomonas aeruginosa* ATCC 27853, *Salmonella typhi* ATCC 13311, and *Candida albicans* ATCC 10231 which have been standardized with a turbidity of Mc Farland 0.5. Making selective media VJA, BCA, PSA, BSA, RBC ie each medium is weighed with an analytical balance dissolving agar with water, then heated while stirring using a gas stove or hot plate stirrer then the media is loaded in a test tube then sterilized using an autoclave at 1210C for 15 minutes. Making BHI is by weighing BHI media with analytical balance put in an erlenmeyer flask diluted with distilled water then put in a sterile test tube and then all the media is sterilized using an autoclave at 1210C for 30 minutes [7].

Preparation of *Staphylococcus aureus* ATCC 2592 Suspension, *Bacillus subtilis* ATCC 6633, *Pseudomonas aeruginosa* ATCC 27853, *Salmonella typhi* ATCC 13311, and *Candida albicans* ATCC 10231 which had been rejuvenated in VJA, BCA, PSA, BSA, and RBC solids taken with *ose* and ATCC 13311 needles, and inserted with *ose* and inserted needles. into a test tube containing 10 ml of liquid BHI medium then vortex for 1 minute, then incubated for 24 hours at 37oC. The bacterial suspension is adjusted to Mc Farland's turbidity standard 0.5. The turbidity of the Mc Farland standard 0.5 is equivalent to the number of 1.5x108 CFU / mL. The purpose of adjusting the bacterial suspension to the Mc Farland 0.5 standard is that the number of bacteria used is the same during the study and reduce bacterial density during testing.

Bacterial characterization was carried out using suspected bacteria in the colony observation, taken one *ose* and then smeared on a glass object. Smear the glass object then drop with Gram A (violet crystal solution) ± 1 minute then rinse, drop again with Gram B (Lugol iodine) ± 1 minute then rinse, drop again with Gram C (70% ethanol) ± 1 minute later rinsed, dropped again with Gram D (safranin) let stand ± 1 minute then rinsed. Glass objects that have been painted are seen in a microscope (Mulyadi, 2011). Results *Pseudomonas aeruginosa* ATCC 27853 and *Salmonella typhi* ATCC 13311 were classified in Gram-negative bacteria with red cell color. *Staphylococcus aureus* ATCC 2592 and *Bacillus subtilis* ATCC 6633 are classified in Gram-positive bacteria with a purple cell color. The *Candida albicans* ATCC 10231 fungus is classified in Gram-positive bacteria in purple. Biochemical tests of *Pseudomonas aeruginosa* ATCC 27853 and *Salmonella typhi* ATCC 13311 were carried out with Sulfide Indole Motility (SIM) media, Lysin Iron Agar (LIA), Klinger Iron Agar (MCH) and citrate while *Staphylococcus aureus* ATCC 2592, *Bacillus subtilis* ATCC 6633 were tested for coagulase tests. and catalase. The *Candida albicans* ATCC 10231 fungus was tested for coagulase and catalase.

D. Antimicrobial test

Preparation of plant extract stock using DMSO solvent. Each of these tubes has some dilution concentrations of 40%, 20%, 10%, 5%, and 2.5%. BHI media was added 0.5 ml into each test tube aseptically, the first tube was added 0.5 ml of plant extract for each fraction, then shaken then 0.5 ml of the first tube was taken into the second tube, and from the tube the second 0.5 ml is taken into the third tube and so on until the fifth tube. Bacterial suspension in the BHI medium was put into each test tube as much as 0.5 ml. DMSO as a negative control, antibiotics as a positive control. All tubes were incubated at room temperature for 18-24 hours, then turbidity was observed to determine MIC, which is the lowest limit of clear media tubes or those that gave negative results. Then determine the KBM by inoculating the preparation from the test tube on VJA, BCA, PSA, BSA, and RBC media in a *petri* dish and incubated for 18-24 hours at 37 0C. KBM showed the lowest concentration of VJA, BCA, PSA, BSA, and RBC media which did not show a growing bacterial colony.

III. RESULT

Research on the Tengger Tribe community in Sukapura Subdistrict which consists of 5 villages namely Ngadirejo Village, Ngadas Village, Jetak Village, Wonotoro Village,

and Ngadisari Village. From 29 resource persons inventory 31 types of diseases, 47 medicinal plants with 60 traditional recipes that can be seen in table 3. The recipes have been used as traditional medicines for generations, in which there are various types of plants and several types of animals and minerals. Plants, animals, and minerals used for traditional recipes in a single form or mixed with other types (herbs). Single generally to overcome mild diseases, for example in wounds can be treated using banana sap and using *ganjan* (*Artemisia vulgaris* L.) to treat nosebleeds whose use is directly cursed in the nose. The Tengger tribe uses a mixture of *Lobak tengger* and jambu wer for relatively severe diseases such as gonorrhea.

The types of plants used in the treatment system are generally plants that grow in the yard and are developed with simple cultivation techniques (from planting), while animal medicinal materials and natural minerals are obtained by the Tengger Tribe if needed and are obtained around the Tengger region. Also, there are several types of plants, animals and mineral materials taken directly from the forests around the Tengger region. The Tengger tribe takes plants, animals and natural minerals as medicines in small quantities so that the shrinkage from medicinal plants in the Tengger region is relatively low. However, the current state of the Tengger region is widely used as a productive agricultural area for vegetable crops, causing some medicinal plants to become scarce. Such as impregnated mushrooms that are not resistant to chemicals for growing vegetables, so there is a need for awareness from all parties to continue to preserve plants or animals that can be used by the Tengger Tribe as a traditional medicine recipe.

TABLE 1. ICF VALUES

No	Bacterial infectious disease	*ICF*
1	Cough	0,88
2	Boils	1
3	Smallpox	0,83
4	Diarrhea	0,9
5	Gonorrhea	0,93
6	*Luka Gores*	0,9
7	Tooth pain	0
8	Sprue	1
9	Typhus	0,87

In this study, an analysis was carried out to determine the types of plants and disease categories that were important to carry out further research by determining the value of the Informant Consensus Factor and Use Value. Use Value is based on the number of respondents who use or know it and the number of respondents who declare a certain plant. One of the quantitative methods is to show the species that are considered most important by a particular population [1]. States that the Informant Concentus Factor is used to identify the most important categories in a study and is used as a parameter for plant species for in-depth research[2].

From the results of the research that has been carried out, it is found several types of diseases that are important in the local community of the Tengger Tribe as traditional medicines that have the potential as antimicrobials can be seen in Table 1 shown by high ICF values. From the results of the research that has been done, I also found several plants that have the potential to be tested in more depth bioactivity from the local community Tengger Tribe, Sukapura District, Probolinggo District, which is shown with high UV values and can be seen in table 2.

TABLE 2. USE VALUE

No	Plant Names		*Disease*	Nilai
	Local	***Scientific***		*Use Value*
1	Adas	*Foeniculum vulgare* Mill.	Antipyretic, cough, itching, bloating, smallpox pus, toothache	0,86
2	Asem Tengger	*Radicula armoracia* Robinson	Cough	0,72
3	Ganjan	*Artemisia vulgaris* L	Nosebleed , antimicrobial	0,79
4	Grunggung	*Rubus roseafolius* Sm.	Diarrhea	0,68
5	Jambu wer	*Prunus persia* Zieb & Zucc	Diarrhea , gonorrhea	0,79
6	Lobak tengger	*Rapanus raphanistrum* L .	Gonorrhea, diarrhea, afrodisiaka, typhus, boils	0,75

Nine types of diseases caused by microbial infections in the Tengger Tribe based on ICF values. ICF values can be seen in table 1. Six types of plants used as antimicrobials by the Tengger Tribe based on UV values can be seen in table 3. From this percentage table Adas (*Foeniculum vulgare* Mill.) Has the highest percentage of knowledge and use. Ganjan (*Artemisia vulgaris* L.), grunggung (*Rubus roseafolius* Sm), Jambu wer (*Prunus persia* Zieb & Zucc.), Asem Tengger (*Radicula armoracia* Robinson) and Lobak tengger (*Rapanus raphanistrum* L).

The results of antimicrobial tests from Asem tengger, ganjan, jambu wer, and lobak tengger plants can be seen in Table 4 recapitulation. From the test results, it can be seen that the knowledge and use of medicinal plants in the Tengger Tribe that have the potential as antimicrobials can be scientifically proven. From the fractions and extracts that have been used, the n-hexane fraction showed the best MBC value in each test plant. The n-hexane fraction has antimicrobial killing power for all test bacteria in the Tengger, Asem tengger, ganjan, jambu wer, and lobak tengger plants. Whereas in the n-hexane fraction, jambu wer only in the bacterium *Bacillus subtilis* ATCC 6633 which did not show the activity of MBC.

Tests on the *Staphylococcus aureus* ATCC 25923 bacteria in the n-hexane fraction of asem tengger samples showed the best MBC activity value, namely at a concentration of 2.5% of the *Staphylococcus aureus* ATCC 25923 bacteria that did not appear. It may be necessary to further research to make a smaller concentration so that the value of the MBC can be seen. *Staphylococcus aureus* is an anaerobic facultative bacterium. More than 90% of clinical isolates produce *Staphylococcus aureus* which have polysaccharide capsules or thin membranes that play a role in bacterial virulence [9]. On agar plates, the colonies are round, 1-2 mm in diameter, convex, opaque, shiny and soft in consistency. Asem tengger from n-hexane fraction is thought to contain alkaloids and glycosides. Both of these active ingredients are thought to kill the development of *Staphylococcus aureus.*

TABLE 3. INVENTORY OF MEDICINAL PLANTS IN THE TENGGER TRIBE

No	Plant Names		Family	Use	
	Local	*Scientific*		*Plant Section*	*Disease*
1	Adas	*Foeniculum vulgare* Mill.	Apiaceae	Leaves, flowers, roots	Antipyretic, cough, itching, bloating, smallpox pus, toothache
2	Alang-alang	*Imperata cylindrica* L.	Gramineae	Roots	Diuretic, antypiretic
3	AsemTengger	*Radicula armoracia* Robinson	Brassicaceae	Leaves	Cough
4	Bawang merah	*Allium ascolanicum* L.	Liliaceae	Herbs	Antipyretic , antibacterial
5	Bawang pre	*Allium fistulosum* L	Liliaceae	Herbs	Analgesic
6	Bawang putih	*Allium sativum* L.	Liliaceae	Herba	Stamina, dizziness, wounds
7	Binahong	*Anredera cordifolia* (Ten.) Steenis	Bacellaceae	Leaves	Antimicrobial
8	Calitus	*Eucalyptus globulus* Labill.	Myrtaceae	Leaves	Antipyretic
9	Ceplukan	*Physalis angulata* L.	Solanaceae	Leaves	Hemorrhoid
0	Dadap	*Erythrina lityhosperma* Miq.	Fabaceae	Leaves	Antipyretic
11	Dringu	*Acorus calamus* L.	Araceae	Leaves	Antipyretic
12	Ganjan	*Artemisia vulgaris* L	Asteraceae	Leaves	Nosebleed , antimicrobial
13	Grunggung	*Rubus roseafolius* J.E	Rosaceae	Fruit	Diarrhea
14	Jagung	*Zea mays*	Poaceae	Fruit	Smallpox pus
15	Jahe	*Zingiber officinale* Roscoe	Zingiberaceae	Rhizome	Cough
16	Jambu biji	*Psidium guajava* L.	Myrtaceae	Leaves	Diarrhea
17	Jambu wer	*Prunus persia* Zieb & Zucc	Myrtaceae	Leaves ,fruit	Diarrhea , gonorrhea
18	Jambe	*Areca catechu* L.	Arecaceae	Fruit	Constipation
19	Jamur impes	*Bovista gigantean* (Batsch) Gray	Lycoperdaceae	Mushroom	*Beri-beri*
20	Jeruk nipis	*Citrus aurantifolia* Swingle	Rutaceae	Fruit	Cough
21	Kamboja	*Plumeria rubra* L.	Apocynaceae	Sap	Tooth pain
22	Kayu putih	*Melaleuca leucadendra* L.	Myrtaceae	Oil	Carminative , antipyretic
23	Kencur	*Kaempferia galangal* L.	Zingiberaceae	Rhizome	Carminative
24	Keningar	*Cinnamomum burmani* (Nees & Nees) Bl.	Lauraceae	Bark	Tonic
25	Ketela pohon	*Manihot utilissima* Pohl	Euphorbiaceae	Leaves	Tonic
26	Kunyit	*Curcuma domestica* Valeton	Zingiberaceae	Rhizome	Antipyretic , headache
27	Lampes	*Ocimum* sp.	Lamiaceae	Leaves	Antipyretic , headache, antiflatulent
28	Laos	*Alpinia galanga* L.	Zingiberaceae	Rhizome	Antifungal
29	Lempuyang	*Pragmites australis*	Poaceae	Roots	Tonic
30	Lobak tengger	*Rapanus raphanistrum* L .	Brassicaceae	Roots	Gonorrhea,diarrhea, Afrodisiaka,typhus, boils
31	Manggis	*Garcinia mangostana* L.	Clusiaceae	Rind	Diarrhea
32	Merica	*Piper nigrum* L.	Piperaceae	Fruit	Stamina
33	Pakis	*Diplazium esculentum* (Retz.) Sw.	Polypodiaceae	Herbs	Antirheumatic
34	Pangotan	*Microsorium buergerianum* (Miq.) Ching	Polypodiaceae	Herbs, roots	Aching rheumatic pain, abdominal pain, itching, stamina.
35	Pepaya	*Carica papaya* L.	Caricaceae	Leaves	Body endurance
36	Pisang	*Musa paradisiaca* L.	Musaceae	Fruit , sap	Diarrhea , antibacterial
37	Pring kuning	*Bambusa vulgaris* Schrad.	Graminae	Roots	Anti-inflammatory , jaundice
38	Pule	*Alstonia scdolaris* R. Br.	Apocynaceae	Kulit	Immunomodulator
39	Simbukan	*Paedaria foetida* L.	Rubiaceae	Leaves	Antiflatulent
40	Seledri	*Apium graveolens* L.	Apiaceae	Leaves	Hypertensi
41	Sirih	*Piper betle* L.	Piperaceae	Leaves	Antiflatulent
42	Stroberi	*Fragaria* sp.	Rosaceae	Roots	Tonic
43	Tebu hitam	*Saccaharum officinarum* L.	Poaceae	Steam	*Tenggorokan serik*
44	Temulawak	*Curcuma xanthorhiza* L.	Zingiberaceae	Rhizome	Antipyretic
45	Tepung otot	*Borreria laevis*	Campanulaceae	Herbs	Sciatica, diabetes mellitus
46	Terong belanda	*Cyphomandra betacea* (Cav.) Sendtn.	Solanaceae	Fruit	Aphrodisiac
47	Tirem	*Cayratia clematidea* Domin	Vitaceae	Leaves	Antihistamines,itching

TABLE 4. RECAPITULATION OF THE MBC VALUE (%) OF THE ANTIMICROBIAL TEST

Bacteria	Extract				Water Faction				Ethyl Acetate Faction				n hexana fraction			
	A	G	J	L	A	G	J	L	A	G	J	L	A	G	J	L
S. aureus	40	20	+	40	5	10	+	+	5	10	+	+	2,5	10	40	40
B. subtilis	40	40	+	40	10	40	+	40	40	40	+	20	40	40	+	10
P. aeruginosa	+	+	+	40	+	+	+	40	+	+	40	40	40	40	40	20
S. typhi	40	40	40	20	40	40	+	40	40	+	40	20	40	40	20	20
C. albicans	+	40	40	10	+	20	+	20	40	40	40	10	20	20	20	2,5

Note: (+) positive: there is bacterial growth at all test concentrations, (A) Asem Tengger, (G) Ganjan, (J) jambu Wer, (L) Lobak Tengger

Bacillus subtilis ATCC 6633 has an average MBC value at a concentration of 40% per test plant. *Bacillus subtilis* is a large, positive Gram-shaped bacterium that forms chains and is aerobic. The length of these bacteria is 2-3 μm and the width is 0.7-0.8 μm [8]. These bacteria use sources of N and C for growth energy. The active content of n-hexane lobak tengger fraction is suspected to be alkaloid and glycoside, both of which can provide killing power against *Bacillus subtilis* bacteria at a concentration of 10%.

Tests on the bacterium *Pseudomonas aeruginosa* ATCC 27853 and *Salmonella typhi* ATCC 13311 can be seen in table 4 recapitulation. *Salmonella typhi* gives an average MBC value at a concentration of 40% in each test plant. *Salmonella typhi* MBC test results are less good when compared with positive controls. In general, *Salmonella typhi* bacteria are pathogenic and can infect humans and animals. *Salmonella typhi* in the wild can survive long in water, soil or in food, in the stool to survive 1-2 months. *Salmonella typhi* in breast milk can multiply and live longer, this is because in milk there are fat and sugar proteins which are saprophytic substrates. The n-hexane fraction of lobak tengger provides the best KBM value compared to other plants. The content of alkaloids and glycosides from rapeseed radishes is possible to inhibit growth and provide bactericides to *Salmonella typhi*.

Pseudomonas aeruginosa is rod-shaped, measuring 0.6-2 μm, has no spores, has no sheath, and is Gram-negative. This bacterium can cause infection in wounds, meningitis, and urinary tract infections (UTI) due to the use of catheters and medical devices that are overgrown with bacterial biofilms [8]. *Pseudomonas aeruginosa* is an obligate aerobic that grows easily in many types of breeding because it has very simple nutritional requirements. From various extracts and fractions of plants, the nutritional requirements of *Pseudomonas aeruginosa* can be inhibited, but the MBC value is concluded to be unable to provide a good value when compared to the positive control, with an average value of 40%.

Table 4 shows the MBC values of the *Candida albicans* ATCC 10231 bacteria in the fraction of n-hexane lobak tengger plants 2.5%. Further research is needed for the activity of the n-hexane fraction on the *Candida albicans* ATCC 10231 fungus. Smaller concentrations are made to determine the true value of the MBC. Candida mushrooms are round, oval or oval. *Candida albicans* can disperse glucose and maltose to produce acids and gases. Also, *Candida albicans* produce acid from sucrose and does not react with lactose [9]. The fraction of n-hexane lobak tengger is suspected to have an alkaloid and glycoside content can provide a good MBC value and can be compared with positive controls. Alkaloids and glycosides can inhibit the growth of the fungus candida [10].

Ethnic study of the Tengger tribe, the use of medicinal plants with scientifically proven based on antimicrobial activity tests conducted by researchers. From the fractions and extracts that have been used, the n-hexane fraction showed the best MBC value in each test plant. The n-hexane fraction has antimicrobial killing power for all test bacteria in the lobak tengger, Ganjan and Asem Tengger plants. Whereas in the n-hexane fraction, jambu wer only in the bacterium *Bacillus subtilis* ATCC 6633 which did not show the activity of MBC.

The traditional medicine of the Tengger tribe has the potential as an antimicrobial, so it is necessary to do further research on the active ingredients of plants used as traditional medicine by the Tengger tribe specifically used as antimicrobial and preservation of knowledge or use of traditional medicine in the Tengger tribe because the inheritance pattern is very limited among the ages average of 45 years and above.

IV. CONCLUSION

Inventory of 29 diseases with 60 traditional recipes and 47 plants, 3 animals and 5 natural minerals used as medicine in the Tengger Tribe. How to use plants, animals, and minerals in the Tengger tribe as traditional medicine is very simple. 6 plants have potential as antimicrobial based on UV and ICF values. Antimicrobial test of 4 potential plants, namely asem tengger, ganjan, jambu wer and lobak tengger with 95% ethanol solvent, water fraction, ethyl acetate fraction and n-hexane fraction. The test results showed different activities of each solvent and plant being tested. It was concluded that the four plants tested had the potential for Gram-positive, Gram-negative, and fungal bacteria.

REFERENCES

[1] Albuquerque, U. P., Lucena, R. F. P., Monteiro, J. M., Florentino, A. T. N., Almeida, C. F. 2006. Evaluating Two quantitative Ethnobotanical Techniques. *Ethnobotany Research and Applications* 4:051-060 (2006).

[2] Almeida, C. F., Amorim, E. L. C., Albuquerque, U. P., Maia, M. B. S. 2006. Medicinal Plants Popularly Used in the Xingo Region-A Semi-Arid Location in Northeastern Brazil. *Journal of Ethnobiology and Ethnomedicine* 2006, 2:15.

[3] Batoro, J., Setiadi, D., Chikmawati, T. and Purwanto, Y., 2013. Pengetahuan Tentang Tumbuhan Masyarakat Tengger di Bromo Tengger Semeru Jawa Timur. *WACANA, Jurnal Sosial dan Humaniora*, *14*(1), pp.1-10.

[4] Dephut .2009a. *Kawasan Taman Nasional Bromo Tengger Semeru* http://www.dephut.go.id/informasi/tamnas/bromo_1.html [04 Mei 2009]

[5] Duraipandiyan, V., Ayyanar, M. and Ignacimuthu, S., 2006. Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. *BMC complementary and alternative medicine*, *6*(1), p.35

[6] Hidayat, S.Y.A.M.S.U.L. and Risna, R.A., 2007. Kajian Ekologi Tumbuhan Obat Langka di Taman Nasional Bromo Tengger Semeru. *Biodiversitas*, *8*(3), pp.169-173.

[7] Irianto, Koes. 2006. *Mikrobiologi*. Bandung: Yrama Widya.

[8] Jawetz, Melniek, dan Adelberg. 1996. *Mikrobiologi Kedokteran*. Terjemahan Enugroho E & Maulana RF. Edisi ke-20. Jakarta: EGC.

[9] Jawetz, Melnick, dan Adelberg. 2007. *Mikrobiologi Kedokteran edisi 23.* Jakarta:EGC Penerbit Buku Kedokteran.

[10] Kumalasari, E. and Sulistyani, N., 2013. Aktivitas antifungi ekstrak etanol batang binahong (Anredera cordifolia (Tenore) Steen.) terhadap Candida albicans serta skrining fitokimia. *Pharmaciana*, *1*(2).

[11] Kuntorini, E.M. 2005. Botani Ekonomi Suku Zingiberaceae Sebagai Obat Tradisional Oleh Masyarakat di Kotamadya Banjarbaru. *Bioscientiae.* 2 (1): 25-36.

[12] Notoatmodjo, S. 2002. *Metodologi Penelitian Kesehatan.* Jakarta: PT Rineka Cipta.

[13] Pieroni, A., Quave, C., Nebel, S., dan Henrich, M. 2002. Ethnopharmacy of the Ethnic Albanians (Arbereshe) of Northern Basilicata, Italy. *Fitoterapia*. 72 (2002): 217-241.

[14] Sudardi, B., 2002. Konsep Pengobatan Tradisional Menurut Primbon Jawa. *Humaniora*, *14*(1), pp.12-19.

[15] Sudjatno, A. 1994. *Peran Dukun dan Orang Tua dalam Penentuan Usia Kawin pada Masyarakat Tengger Jawa Timur.* Tidak Dipublikasikan. Laporan Penelitian. Jember: Universitas Jember.