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Biological screening of selected traditional medicinal plants species utilized by local people of Manokwari, West Papua Province

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Abstract. *Lense O. 2011. Biological screening of selected traditional medicinal plants species utilized by local people of Manokwari, West Papua Province. Nusantara Bioscience 3: 145-150.* The aim of the research was to determine the presence of alkaloids and anti-microbial activity in extracts from selected medicinal plants from Manokwari District, West Papua, Indonesia. The method of alkaloid testing followed the standard phytochemical methods. The procedure of the Calibrated Dichotomous Sensitivity (CDS) test was used for the antimicrobial bioassays. Results of biological screening suggested that all but one of the 56 species tested contained different levels of alkaloids. Eleven species showed anti-microbial activity using bioassays of responses to two bacteria, *Salmonella typhi* and *Klebsiella pneumoniae*, and two fungi *Candida albicans*, and *Cryptococcus neoformans*; none of the plant extracts showed an antimicrobial effect against the bacteria *Escherichia coli*. Extract of *Planconella* sp. was the most active one as it showed activity against three different organisms (*C. albicans*, *C. neoformans*, and *S. typhi*).

Keywords: biological screening, local people, Manokwari, traditional medicinal plant, West Papua.

Abstrak. *Lense O. 2011. Penapisan hayati beberapa jenis tumbuhan obat tradisional terpilih yang dimanfaatkan oleh masyarakat lokal Manokwari, Provinsi Papua Barat. Nusantara Bioscience 3: 145-150.* Tujuan penelitian ini adalah untuk mengetahui adanya alkaloid dan aktivitas anti-mikroba ekstrak beberapa tanaman obat terpilih dari Kabupaten Manokwari, Papua Barat, Indonesia. Metode pengujian alkaloid mengikuti metode fitokimia standar. Prosedur uji *Calibrated Dichotomous Sensitivity* (CDS) digunakan untuk uji hayati anti-mikroba. Hasil penapisan hayati menunjukkan bahwa ke-56 jenis yang diuji mengandung alkaloid dengan kadar yang berbeda-beda, kecuali satu jenis. Sebelas jenis menunjukkan aktivitas anti-mikroba berdasarkan respons uji hayati terhadap dua bakteri, *Salmonella typhi* dan *Klebsiella pneumoniae*, dan dua jamur *Candida albicans* dan *Cryptococcus neoformans*, tidak satupun dari ekstrak tanaman yang menunjukkan efek anti-mikroba terhadap bakteri *Escherichia coli*. Ekstrak *Planconella* sp. adalah yang paling aktif karena menunjukkan aktivitas terhadap tiga organisme yang berbeda (*C. albicans*, *C. neoformans*, dan *S. typhi*).

Kata kunci: penapisan biologi, masyarakat lokal, Manokwari, tumbuhan obat tradisional, Papua Barat.

INTRODUCTION

Tropical rainforests with their high levels of diversity are considered to have great potential as a source of new drugs. The global trend of going "natural" or "green" has also contributed to the tropical rain forest is a target for such activities, combined with the added fear of forest depletion caused by logging, transmigration, and other developmental activities. Screening for biological activity using simple and fast bioassays is now being used to identify potentially useful plants. Phytochemical separations are routinely guided by bioassays which will ensure the isolation of bioactive agents irrespective of whether they belong to a certain class of compound or not.

The Manokwari tropical rainforest comprises a very rich and characteristic flora that covers more than 30,000 square kilometers of West Papua. Many of the plants in the forests have been used as traditional medicines by the local people living in the area in order to treat several tropical diseases including malaria, fever, dysentery, wounds, and fungal or bacterial infections (MacKinnon 1991). However, no phytochemical analyses of medicinal plants from the Manokwari region have been conducted.

Fungi and bacteria cause important human diseases in tropical regions, especially in immunocompromised or immunodeficient patients. Despite the existence of potent antibiotic and antifungal agents, however, resistant or multi-resistant disease strains are continuously appearing, imposing the need for continuous research for and development of new drugs (Silver and Bostian 1993). In an effort to discover new compounds, many research groups have screened plant extracts to detect secondary metabolites with relevant biological activities.

The aim of the present study was to determine the presence of alkaloids and anti-microbial activities in extracts from selected medicinal plants from Manokwari District, West Papua, Indonesia.

MATERIALS AND METHODS

Collecting the samples

Samples of potentially useful plants were collected in the field from February to April 2000 in collaboration with the State University of Papua (UNIPA), Manokwari, West Papua Province, Indonesia. Specimens were collected at the same time for identification. Samples for laboratory analysis were chosen from the plants that are used as medicine sources by traditional healers (Martin 1995). Plant parts such as leaves, fruits, flowers, bark, stems, and roots were collected for biological screening.

Preparing and preserving the samples

Samples of fresh plant parts such as leaves, fruits, flowers, bark, stems, and roots were broken or cut into suitable sizes for transport. Plant parts such as roots and bark were chopped into pieces using clippers. All plants were air-dried before being transported to the laboratory, where they were dried in an oven at a maximum temperature of 50°C for 72 hours or more depending on the water content of the samples (Martin 1995).

Analysis of the samples

Alkaloid screening

The method of alkaloid testing followed the procedures of Culvenor and Fitzgerald (1963); Frelich and Marten (1973). Seven and half gram of finely ground plant material was rapidly extracted with 75 mL of ammoniacal chloroform ($CHCl_3$). After filtration, the solution was extracted by adding 9 mL of sulphuric acid. Three milliliters of extract was then transferred to a test tube and 9 drops of silicotungstic acid added (12 g silicotungstic acid to 100 mL water). The presence of alkaloids in the extract phase was detected by the formation of a precipitate. Where the results were positive, the amount of alkaloid present was visually assessed and ranked into five classes according to the relative abundance of the precipitate (Collins et al. 1990; Barr et al. 1993).

Anti-microbial screening

The procedure of calibrated dichotomous sensitivity test (Bell et al. 1999) was used for the anti-microbial bioassays. In the laboratory, 2.5 g of dry finely ground plant material was grounded into a powder and then divided into samples for different mixed with 50% and 90% ethanol, and shaken for 24 hours. The extracts were filtered and left to stand for 24 hours under vacuum at 40°C. Under sterile conditions, 5 µL of extract was applied to a disc of filter paper and placed on an agar plate that had been inoculated with a single species of bacterium (*Salmonella typhi*, *Klebsiella pneumoniae*, and *Escherichia coli*) or fungus (*Candida albicans*, *Cryptococcus neoformans*), all of which are human pathogens.

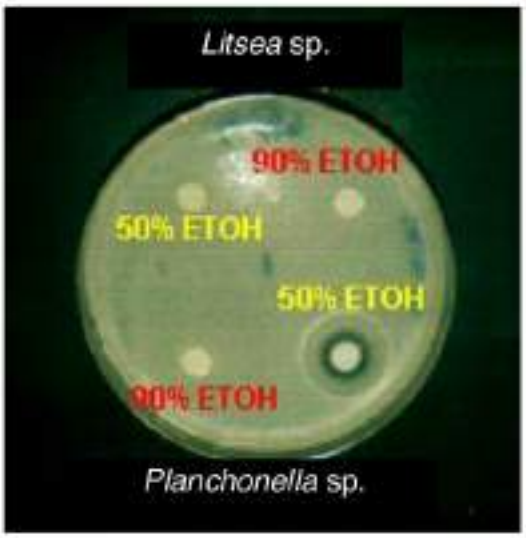

Figure 1. The activity of extracts of *Litsea* sp. and *Planchonella* sp. against *Candida albicans*. The filter paper discs represent the plant extracts that were extracted using 50% and 90% EtOH. The clear zone indicated the plant extract was effective against *C. albicans*.

After inoculation, inverted plates were incubated for 18-24 hours at 35°C. Inhibition of growth of the bacteria and fungi by the plant extracts was examined by measuring the diameter of the clear zone (a microbe-free circle) that might form around the impregnated filter paper disc. If the disc showed clear zones of 7 mm or more, the microbes were considered vulnerable to inhibition by the plant extract and that the plant displayed anti-microbial activity. In contrast, if the clear zone was 6 mm or less, it indicated that the microbes were resistant to the plant extract (Martin 1995). Figure 1 shows an example of agar plate used in anti-microbial activity screening. It shows that the extract of *Planchonella* sp. was effective against *C. albicans*, whereas the extracts of *Litsea* sp. showed no activity against *C. albicans*.

RESULTS AND DISCUSSION

Alkaloid screening

Fifty-eight ethanolic extracts of various parts of 56 plants used as traditional medicinal plants were investigated for the presence or absence of alkaloids. All but one of these (55 species; 98%) contained various levels of alkaloids (Table 1), but only six appeared to have a high level of alkaloid presence (Figure 2).

The results show a much higher percentage of plants giving a positive alkaloid response than similar studies elsewhere. For example, a survey conducted on endemic species in Tasmania, Australia, indicated only15% of the species have a positive alkaloid reading (Bick et al. 1996). In a study on alkaloids of medicinal plants from Lombok,

Table 1. Manokwari medicinal plants species giving negative and positive test results for alkaloids.

Plant species	Family	Localities	Medical conditions	Parts tested (results)
Acorus calamus L.	Araceae	Ransiki, Anggi	Dysentery	Rhizomes (++++)
Adenanthera microsperma	Mimosaceae	Manokwari	Epilepsy, diarrhea, quinsy, fever	Bark (++++)
Ageratum conyzoides	Asteraceae	Wasior, Minyambouw	Wound	Leaves (++++)
Alpinia purpurata	Zingiberaceae	Kebar, Ransiki	Earaches	Stem (+++)
Alstonia scholaris R.Br.	Apocynaceae	Ransiki, Kebar, Wasior, Manokwari	Fever, Malaria	Bark (++++++)
Artocarpus communis	Moraceae	Ransiki, Anggi, Kebar, Wasior, Merdey	Wounds, gonorrhea	Bark (++++)
Biophytum petersianum	Oxalidaceae	Kebar	Desire of having a child	Leaves (++++)
Blumea serotil's	Asteraceae	Ransiki, Anggi	Cold, influenza	Leaves (+++)
Calophyllum inophyllum L.	Guttiferae	Ransiki	Irritated eyes	Leaves (++++)
Canarium sp.	Burseraceae	Ransiki	Liver diseases	Bark (++++)
Casuarina rumphiana	Casuarinaceae	Manokwari	Malaria	Bark (++++)
Coelogyne asperata	Orchidaceae	Merdey	Chest pain	Bulb (+++)
Colocasia sp.	Araceae	Ransiki, Anggi	Childbirth	Bulb (+++)
Commelina nudiflora	Commelinaceae	Ransiki, Anggi	Dysentery	Leaves (+++)
Cordyline fruticosa	Liliaceae	Ransiki, Anggi, Minyambouw	Dysentery, irritated eyes	Leaves (+++)
Costus speciosus (Koen) Sw.	Zingiberaceae	Merdey	Ear pain, stomachaches, food poisoning	Stem (+++)
Diplazium esculentum (Retz.) Sw.	Polypodiaceae	Kebar	Headaches, wounds	Leaves (++)
Dysoxylon arborescens Miq.	Meliaceae	Kebar	Malaria and strong fever	Bark (++++)
Drymaria quercifolia J.Sm	Polypodiaceae	Minyambouw	Fever, malaria	Leaves (+++)
Dryopteris sp.	Polypodiaceae	Wasior, Kebar	Snakebite	Leaves (+++)
Endosperrnum moluccanum	Euphorbiaceae	Ransiki	Fever	Bark (+++)
Euodia sp.	Rutaceae	Merdey	Asthma	Bark (++++)
Ficus sp.	Moraceae	Ransiki, Anggi, Kebar	Asthma	Bark (++++), Twigs (+++)
Ficus sp2.	Moraceae	Wasior	Abscess, chest pain	Leaves (+++), Roots (+++)
Gigantochloa sp.	Poaceae	Wasior	Toothaches	Outer bark (++++)
Gnetum gnemon	Gnetaceae	Merdey	New wounds	Bark(++++)
Homalanthus nutans (Forst.f.) Guillemin	Euphorbiaceae	Ransiki, Anggi, Wasior, Kebar	Liver diseases	Leaves (++++)
Horsfieldia sp.	Myristicaceae	Merdey	Stomachaches	Bark (+++)
Intsia palembanica	Caesalpiniaceae	Merdey	Stomachaches	Bark (++)
Lansium domesticum Jack.	Meliaceae	Wasior	Dysentery	Bark (+++)
Laportea interrupta (L.) Chew.	Urticaceae	Kebar	Malaria	Leaves (+++)
Litocarpus brassi	Fagaceae	Kebar	Muscular pain	Bark (++++)
Litsea sp.	Lauraceae	Manokwari, Minyambouw	Scabies	Bark (++++)
Loranthus sp.	Loranthaceae	Merdey	Gonorrhoea	Leaves (++++)
Macaranga tanarius	Euphorbiaceae	Ransiki, Anggi,Kebar	Fever (babies)	Leaves (++++)
Mucuna novoguinensis	Fabaceae	Ransiki, Kebar	Diarrhoea., malaria, fever	Leaves (+++)
Nauclea orientalis	Rubiaceae	Minyambouw, Merdey	Easy birth	Shoot (++++)
Octomeles sumatrana Miq.	Datiscaceae	Ransiki, Anggi	Fever	Bark (++++)
Palaquium sp.	Sapotaceae	Merdey	Unspecified men sexual diseases	Bark (++++)
Pentaphalangium pachycarpum A.C. Smith.	Clusiaceae	Ransiki, Anggi	Hinge pain	Bark (+++)
Pimelodendron amboinicum HSK	Euphorbiaceae	Ransiki, Anggi, Kebar, Merdey	Headaches, unspecified men sexual diseases	Leaves (+++)
Piper sp.	Piperaceae	Wasior, Ransiki, Anggi	Stomachaches	Leaves (+++)
Pipturus repandus (Bl). Wedd.	Urticaceae	Ransiki, Anggi, Merdey, Manokwari	Fever, diarrhea, epilepsy	Bark (+++)
Pisonia sp.	Nyctaginaceae	Merdey	Headaches	Roots (+++)
Planchonella sp.	Sapotaceae	Merdey	Dysentery	Bark (++++)
Polygonum sp.	Polygonaceae	Wasior, Kebar	Scabies	Root (++++)
Polygonum sp.	Polygonaceae	Kebar	Dysentery	Leaves (++++)
Pothos scandens	Araceae	Merdey	Diarrhea	Leaves (-)
Pterocarpus indicus Willd.	Papilionaceae	Kebar	Dysentery	Bark (++++)
Rhaphidophora obliqujfolia Scott.	Araceae	Wasior	New wounds	Leaves (++++)
Rhaphidophora pertusa Roxb.	Araceae	Wasior, Merdey	Liver diseases, unspecified men sexual diseases	Leaves (+++)
Ricinus communis L.	Euphorbiaceae	Ransiki	Malaria, decoction before delivering a baby	Leaves (++++)
Schismatoglottis calyptra Roxb.	Araceae	Kebar	Dislocated knee or arms	Leaves (+++)
Scindapsus hederaceus	Araceae	Merdey	Colds of infants	Leaves (+++)
Spathodea campanulata	Bignoniaceae	Minyambouw	Tonic	Bark (++++)
Spathoglottis sp.	Orchidaceae	Merdey	Wounds	Bulbs (+++)

Note: The symbol in the bracket in the last column indicate the level of alkaloids presented: (-) no alkaloid, (+) very low, (++) low, (+++) medium, (++++) medium-high, and (+++++) high level of alkaloids presented.

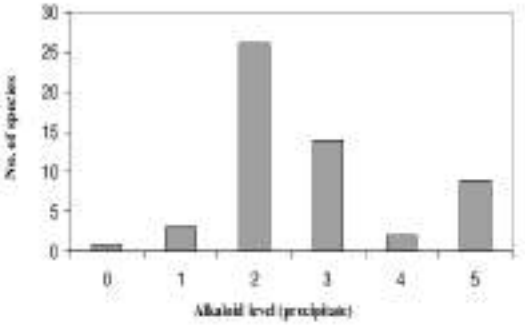

Figure 2. Frequency distribution of the qualitative amount of alkaloids in 56 species medicinal plants from Manokwari District giving positive tests for alkaloids (5 is high).

23% of the medicinal plants tested showed positive result for alkaloids (Hadi and Bremner 2001). In a similar alkaloid survey from Queensland, Australia, involving many tropical and sub-tropical species, 20 % of the species tested gave positive result (Hadi and Bremner 2001). In a phytochemical survey of medicinal plants in Sayap-Kinabalu Park, Sabah, Malaysia, where 60 species were tested for alkaloids, only eight species (13.3%) gave positive results (Said et al. 1998).

Some of the species tested for alkaloids have been reported to contain alkaloids and other active compounds. The rhizomes of *Acorus calamus* contain leucoantho-cyanins and 5,7-dihydroxyflavanol (Cambie and Brewis 1997). The active ingredient in *A. calamus* is b-asarone which belongs to the phenylpropanoid family (Baxter et al. 1960). The species of *A. calamus* contained the greatest amount of b-asarone (70-96%) (Streloke et al. 1989), including eugenol, methyl-eugenol, acorin, calamenol, calamene, calameone (Woodley 1991); cineole, linalool, pinene, resins, safrole, and tannins are also reported (Cowan 1999).

Hadi and Bremner (2001) reported that the leaves, bark, and roots of *Alstonia scholaris* and *Ficus septica* contain unknown alkaloids. The seeds of these species are rich in hallucinogenic indole-alkaloids (alstovenine, venenatine, chlorogenine, reserpine, ditamine, echitamine) and chlorogenic acid (a mild bladder and urethra irritant, resulting in increased sensitivity of the genital region), whereas the only alkaloids present in the bark and latex are ditamine, echitamine, and echitenine.

Ming (1999) reported that *Ageratum conyzoides* contains alkaloids, mainly the pyrrolizidinic group, which suggest that it may be a good candidate for pharmacological studies. Alkaloid has been found in the species, with hepatotoxic activity including 1,2-desifropyrrolizidine and lycopsamine. Alkaloids also were found in a hexane extract of *A. conyzoides* in Africa (Wiedenfeld and Roder 1991). Menut et al. (1993) reported that this species contained high percentage of precocene 1, particularly those plants from Nigeria and Cameroon which were rich in precocene 1, while oil extracted from Vietnamese and Fijian (Suva) plants contained roughly the same amounts of both compounds. Terpenoids, steroids, flavonols, glucosides and polyoxygenated flavones have been isolated from plants from India, China, Nigeria, and Northern Vietnam. Monoterpene a-pinene and eugenol have been detected in Indian plants, and a-farnesene, humulene and caryophyllene oxide have been identified in Fijian plants (Menut et al. 1993). Hormones ageratochromene and 7-methoxy-2, 2-methylchromene (precocene-1) form 60 % of the total essential oils from the flowers, leaves, and stems of a Fijian variety (Aalbersberg and Singh 1991).

The seeds of *Lansium domesticum* are known to contain an amount of an unnamed alkaloid, 1% of an alcohol-soluble resin (Morton 1987), and triterpenes (Bunyapraphatsara and Saralamp 1982). Bunyapraphatsara and Saralamp (1982) found only anti-inflammatory activity confined to the fractions containing triterpenes in seed extracts. The non-polar triterpene fraction showed systemic activity in a rat carrageenin-induced model of inflammation while the polar fractions reduced ear inflammation. The findings confirmed the efficacy of the seeds of *L. domesticum* in reducing ear inflammation (Saralamp and Bunyapraphatsara 1995).

Cowan (1999) reported that the seeds of *Ricinus communis* contained up to 3 % of the toxalbumin ricin. This is one of the most toxic substances known. They also contained alkaloid ricinine, cyanogenic glycosides, flavonoids, steroidal sapogenin, garlic acid, and potassium nitrate, and the oil is rich in ricinoleic, stearic, undecylenic acid, and ricinine (Grainge and Ahmed 1988).

Moreover, some other genera documented in this study have been reported to contain alkaloids and other compounds. The rhizomes of *Alpinia galanga* (L.) Willd., reported containing kaempferia, galaagin, a volatile oil, and galangol (which yields cineole), pinene, and eugenol (Perry 1980). The extract of stem and leaves of *Blumea balsamifera* (L.) DC. contain alkaloids and tannins flavonoids (Grainge and Ahmed 1988; Bhuiyan et al. 2009). Fruits of *Piper guineense* Schum. & Thonn. contain the amides piperine, N-iso-butyloctadeca-trans-2-trans-4-dienamide, sylvatine, a-,b-dihydropiperine and trichostachine, and *P. nigrum* has piperolide, dihydropiperolide, and guineensine (Miyakado et al. 1989). The essential oil from the berries is composed of the terpenes: phellandrene, pinene, and limonene (Oliver 1986).

Said et al. (1998) reported that the leaves of *Lithocarpus confragosus* contained saponin (3+); the leaves and the bark of *Litsea ellipticacea* contained alkaloid (2+) and saponin (2+); the leaves of *Ficus hemsleyana*, *F. lepicarpa*, *F. rubrocuspidata*, and *F. sulcnifera* contained saponin (2+, 2+, 3+, and 3+ respectively), and *Palaquium* sp. (leaves) contained saponin (3+).

Anti-microbial activity screening

Of the 56 plant extracts tested in an agar diffusion assay, 11 species were effective against the two gram-negative bacteria (*Klebsiella pneumoniae*, and *S. typhi*) and two fungi (*C. albicans*, *C. neoformans*) assayed.

Planchonella sp. was the most active species, showing activity against 3 different organisms (*C. albicans*, *C. neoformans*, and *S. typhi*; Table 2 and Figure 3) followed by *Adenanthera microsperma* and *Dysoxylum arborescens*,

both of which were effective in two bioassays (*C. neoformans* and *Klebsiella pneumoniae*). *C. neoformans* was the most susceptible of the two yeasts tested, with 7 extracts from a total of 11 extracts displaying activity against this organism. Against *C. neoformans*, the extracts from *Ficus* sp2. showed very significant inhibition (22.75 mm inhibition zone), followed by *Dysoxylum arborescens* (20.25 mm inhibition zone) and *Laportea interrupta* (17.50 mm inhibition zone). On the other hand, the extracts from *Alpinia purpurata* and *Lithocarpus brassii* showed less significant inhibition (7.5 mm inhibition zones) against *C. neoformans* and *C. albicans* respectively. None of the plant extracts was effective against *Escherichia coli*.

The results of the laboratory-based anti-microbial activity screenings of plant species from Manokwari District suggested why some traditional medicinal plants might be effective against certain medical conditions. The bark of the stem of *Planchonella* sp, *Adenanthera microsperma*, and the leaves of *Loranthus* sp. are very commonly used by the native people in Manokwari District to treat dysentery, diarrhea, and fever. The plant extracts of these species were effective against *S. typhi* which is one of the pathogenic microbes causing fever, diarrhea, and headaches (Wasfy et al. 2000). The use of the bark of stems of *Lithocarpus brassii* in treating ringworm has also been supported by the anti-microbial screening results. The extracts of this species were confirmed effective against *C. albicans* which is an opportunistic organism (yeast) causing an itchy rash and occurs most often in warm, moist areas, such as under the arms, between skin folds, and in the groin (Bartie et al. 2001). *Candida* also causes mouth infections, particularly in babies and elderly.

Table 2. Manokwari medicinal plants species giving positive tests of Anti-microbial activity against *Candida albicans* (Ca), *Cryptococcus neoformans* (Cn), *Salmonella typhi* (St), *Escherichia coli* (Ec), *Klebsiella pneumoniae* (Kp)

Plant name	Medical conditions treated	Part tested	Diameter of inhibition zones									
			50 % EtOH					90% EtOH				
			Ca	Cn	St	Ec	Kp	Ca	Cn	St	Ec	Kp
Acorus calamus	Dysentery	Rhizomes		16.00								
Adenanthera microsperma	Epilepsy, diarrhea, nausea, and fever	Bark			9.00			8.17				
Alpinia purpurata	Earaches	Stem		7.88					7.50			
Colocasia sp.	Childbirth	Bulbs	8.50						8.50			
Dioscylon arborescens	Fever, malaria	Bark		20.50								16.00
Ficus sp2.	Eye irritation, toothaches	Leaves		22.50								
Intsia palembanica	Dysentery	Bark		11.38					12.50			
Laportea interrupta	Muscular pains	Leaves		17.50								
Lithocarpus brassii	Ringworm	Bark	8.13					7.50				
Loranthus sp.	Fever in babies	Leaves			9.00					8.00		
Planchonella sp.	Dysentery, diarrhea	Bark	12.25	8.00	10.25							

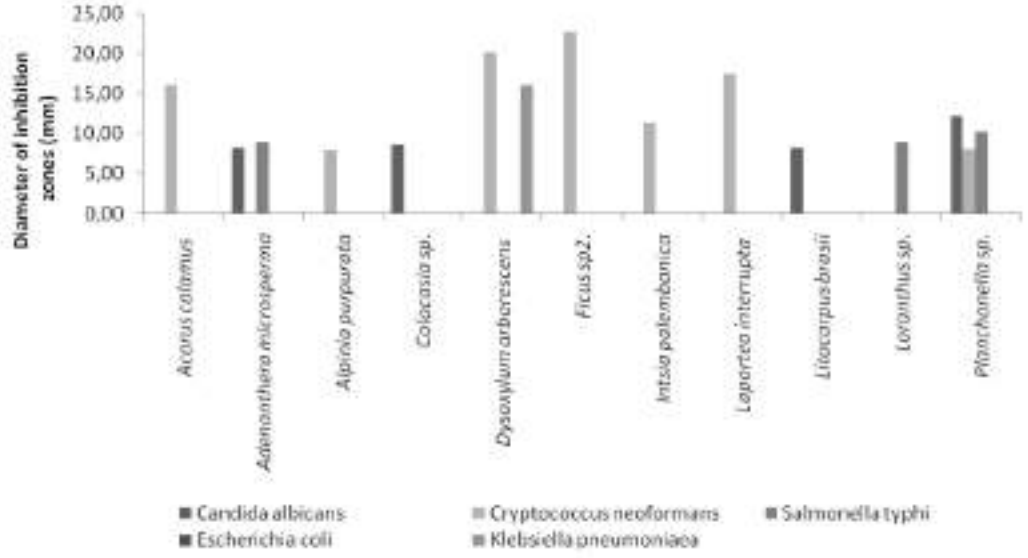

Figure 3. The activity of extracts of Several Manokwari medicinal plants against 5 different bioassays tested.

In addition, the anti-microbial screening indicated that the extracts of fresh leaves of the nettle *Laportea interrupta* and the bark of the stem of *Dysoxylum arborescens* were very effective against *C. neoformans* that can cause fatigue and fever (symptoms of pneumonia; Kopecka et al. 2000). This finding agrees with the use of *Laportea interrupta* and *Dysoxylum arborescens* in this region to treat muscular pains for fatigue and fever, respectively (Table 2). However, there is no previous information regarding preparations of antibiotics from *Laportea* sp. to treat this pathogen, although Foster and Duke (1990) reported that it has shown antibacterial and central nervous system depressant activity.

CONCLUSION

Initial work on Manokwari medicinal plants has resulted in fifty-six species being collected and screened for the presence of alkaloids and anti-microbial activity. Results indicated that at least 55 species of the 56 species rainforest species analyzed were shown to contain different level of alkaloids. Anti-microbial activity tests indicated that 11 species were effective against three Gram-*negative (Escherichia coli, Klebsiella pneumoniae*, and *Salmonella typhi*) bacterial species and two fungi (*Candida albicans, Cryptococcus neoformans*). *Planconella* sp. was the most active species as it showed activity against three different organisms (*C. albicans*, *C. neoformans*, and *S. typhi*).

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Biological screening of selected traditional medicinal plants species utilized by local people of Manokwari, West Papua Province

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Abstract. *Lense O. 2011. Biological screening of selected traditional medicinal plants species utilized by local people of Manokwari, West Papua Province. Nusantara Bioscience 3: 145-150.* The aim of the research was to determine the presence of alkaloids and anti-microbial activity in extracts from selected medicinal plants from Manokwari District, West Papua, Indonesia. The method of alkaloid testing followed the standard phytochemical methods. The procedure of the Calibrated Dichotomous Sensitivity (CDS) test was used for the antimicrobial bioassays. Results of biological screening suggested that all but one of the 56 species tested contained different levels of alkaloids. Eleven species showed anti-microbial activity using bioassays of responses to two bacteria, *Salmonella typhi* and *Klebsiella pneumoniae*, and two fungi *Candida albicans*, and *Cryptococcus neoformans*; none of the plant extracts showed an antimicrobial effect against the bacteria *Escherichia coli*. Extract of *Planconella* sp. was the most active one as it showed activity against three different organisms (*C. albicans*, *C. neoformans*, and *S. typhi*).

Keywords: biological screening, local people, Manokwari, traditional medicinal plant, West Papua.

Abstrak. *Lense O. 2011. Penapisan hayati beberapa jenis tumbuhan obat tradisional terpilih yang dimanfaatkan oleh masyarakat lokal Manokwari, Provinsi Papua Barat. Nusantara Bioscience 3: 145-150.* Tujuan penelitian ini adalah untuk mengetahui adanya alkaloid dan aktivitas anti-mikroba ekstrak beberapa tanaman obat terpilih dari Kabupaten Manokwari, Papua Barat, Indonesia. Metode pengujian alkaloid mengikuti metode fitokimia standar. Prosedur uji *Calibrated Dichotomous Sensitivity* (CDS) digunakan untuk uji hayati anti-mikroba. Hasil penapisan hayati menunjukkan bahwa ke-56 jenis yang diuji mengandung alkaloid dengan kadar yang berbeda beda, kecuali satu jenis. Sebelas jenis menunjukkan aktivitas anti- mikroba berdasarkan respons uji hayati terhadap dua bakteri, *Salmonella typhi* dan *Klebsiella pneumoniae*, dan dua jamur *Candida albicans* dan *Cryptococcus neoformans*; tidak satupun dari ekstrak tanaman yang menunjukkan efek anti-mikroba terhadap bakteri *Escherichia coli*. Ekstrak *Planconella* sp. adalah yang paling aktif karena menunjukkan aktivitas terhadap tiga organisme yang berbeda (*C. albicans*, *C. neoformans*, dan *S. typhi*).

Kata kunci: penapisan biologi, masyarakat lokal, Manokwari, tumbuhan obat tradisional, Papua Barat.

INTRODUCTION

Tropical rainforests with their high levels of diversity are considered to have great potential as a source of new drugs. The global trend of going "natural" or "green" has also contributed to the tropical rain forest is a target for such activities, combined with the added fear of forest depletion caused by logging, transmigration, and other developmental activities. Screening for biological activity using simple and fast bioassays is now being used to identify potentially useful plants. Phytochemical separations are routinely guided by bioassays which will ensure the isolation of bioactive agents irrespective of whether they belong to a certain class of compound or not.

The Manokwari tropical rainforest comprises a very rich and characteristic flora that covers more than 30,000 square kilometers of West Papua. Many of the plants in the forests have been used as traditional medicines by the local people living in the area in order to treat several tropical diseases including malaria, fever, dysentery, wounds, and fungal or bacterial infections (MacKinnon 1991). However, no phytochemical analyses of medicinal plants from the Manokwari region have been conducted.

Fungi and bacteria cause important human diseases in tropical regions, especially in immunocompromised or immunodeficient patients. Despite the existence of potent antibiotic and antifungal agents, however, resistant or multi-resistant disease strains are continuously appearing, imposing the need for continuous research for and development of new drugs (Silver and Bostian 1993). In an effort to discover new compounds, many research groups have screened plant extracts to detect secondary metabolites with relevant biological activities.

The aim of the present study was to determine the presence of alkaloids and anti-microbial activities in extracts from selected medicinal plants from Manokwari District, West Papua, Indonesia.