**Essential improvement of non-timber forest products in Myanmar**

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**Abstract.** Non-timber forest products were studied by interviewing the informants during the survey trip to the Tanintharyi Nature Reserve located in Dawei Township and Yephyu Township, Tanintharyi Region, Myanmar. The land area of the reserve forest is 1700 km². Bioprospecting of non-timber forest products focusing on rural area development and systematic utilization of natural resources for sustainable development are popular nowadays. The extraction of economically important natural resources, leaving the forest structurally and functionally intact, has derived as an advanced strategy. The present study is the information of non-timber forest resources of Tanintharyi Nature Reserve located in the southern part of Myanmar, conducted from December 2017 to August 2018 by interviewing the informants of botanical folk knowledge. Totally 55 families, 113 genera, and 143 species were recorded as herbal medicines used locally by Dawei and Myeik (ancient Bamar) ethnic groups. This result will be helpful for the systematic search of biochemical and genetic information to develop commercially valuable products for pharmaceutical and cosmetics.

1. **Introduction**

The term bioprospecting was described by United Nations Development Program in 2016 as follows: "Biodiversity prospecting or bioprospecting is the systematic search for biochemical and genetic information in nature to develop commercially valuable products for pharmaceutical, agricultural, cosmetics, and other applications.” It must fulfill the use of the genetic resources of Nagoya protocol (2011) or as stated in the National law or policy. The human role of biodiversity, together with associated traditional knowledge, creates a space for the better use of the expertise in the development of new professionalism [1]. These mutually beneficial bioprospecting collaborations have enabled to secure legal rights to collect genetic resources in a manner that exceeds norms of ethical business practices [2, 3]. However, local needs tend to discover a new product for sustainable development. Although bioprospecting can happen wherever there is biodiversity, it tends to be focused on where biodiversity is at its richest, as it raises the chances of finding something useful. Hence, the Tanintharyi Nature Reserve that possesses tropical rain forests is focused on bioprospecting.

The area experiences tropical monsoon weather with a distinct wet season, from May to October, followed by an extended dry season. According to the recorded data of the temperature during the last three decades from Dawei Meteorology station, the average temperature varies from 22º C to 32º C. The mean relative humidity is 79%. Annual rainfall and intra-annual distribution of rainfall in coastal
area is generally as high as 5,300 mm. About 90% of the total annual rainfall is received during the rainy season (from May to October), which lasts about five and a half months.

In Myanmar, the Tanintharyi region is wealthy in natural resources, and local people rely on non-timber forest products for their regular needs. Therefore, sustainable development of local people and institute of natural forest are required to emphasize. Furthermore, as one of the global biodiversity hot spots, Tanintharyi Region has no accurate record of ethnobotany survey for non-timber forest products as bioprospecting. To reach the goal of bioprospecting in this area, medicinal folklore over the years has proved to be the precious guide. That may consequently lead to the present-day screening of drugs. In recent years, the use of ethnobotanical information in medicinal plant research has gained considerable attention in segments of the scientific community [4]. To inform the knowledge of sustainable development and utilization of natural resources to local people, then we urgently need to address on bioprospecting of non-timber forest products for enhancement of the livelihoods.

The local knowledge that is unique to a culture or society is called traditional or indigenous knowledge. It is passed down generation by generation, usually by word of mouth and cultural rituals. Moreover, it has been the basis for agriculture, food preparation, health care, education, conservation, and the wide range of other activities that sustain societies in many parts of the world [5]. This research contributes to the understanding of the socio-economic importance of the plants in the study area. It works to identify the factors involved in the deprivation that leads to value-added products in the Tanintharyi Nature Reserve. In this research, 143 species comprised of 113 genera and 55 different families were recorded to be possible value-added products. Most of them are used as antimicrobial agents, carminative, laxative, tonic and appetizer. Some are used as antipyretic, to treat rheumatism, asthma, birth control, antidotes, diuretic, and liver or kidney problems. The rationale is to extract the highest commercial value from genetic resources and indigenous awareness while creating a fair compensation system that can advantage all.

2. Materials and methods

2.1. Study Area
Tanintharyi Region is located in south-eastern Myanmar, the southern boundary of Mon State, west and north of Thailand, and east of the Andaman Sea. Tanintharyi Nature Reserve is situated in the Yebuy and Dawei Townships of the Tanintharyi region. Its a protected area and was established in 2005 with a total area of 1700 km² (Figure 1).

Figure 1. Location of Tanintharyi nature reserve in Myanmar.
2.2. Geographic and forest type overview
Topography varies along this east-west slope from flat or hilly coastal zones to mountainous areas of up to 2000 m in elevation. Lateritic soils and laterites occur at an altitude below 100m above sea-level. The humus content is 1.5 to 3%, and the pH value is between 4 and 5 in those below 100m of altitude. Yellow-brown forest soils are prevalent under wet tropical monsoon forests at altitudes between 100 and 450 m above sea-level. The humus content of this area is, on average, between 2 and 4%. The pH value is between 4.5 and 6.5, and the water holding capacity is 30-35%. At higher altitudes, yellow-brown mountain forest soils are covered. Although broadleaf evergreen forests occupy in much of the region, certain areas contain mixtures with evergreen and deciduous tree species. Leaf drop occurs during the dry season for deciduous tree species but can be highly variable among years, species, and locations.

2.3. The ethnic composition of Tanintharyi region
The majority of inhabitants in the Tanintharyi Region are supposed to be members of the Bamar ethnic group. However, some identify themselves as members of sub-groups, such as the Dawei and Myeik people. While almost all in the Tanintharyi region speak Myanmar language, there are various local dialects, in which some vary quite dramatically from that elsewhere. Different ethnic minorities are also present, including the Karen, Mon, Salon, and Bashu (Malay).

2.4. Data collection
The method of selecting informants depends upon the distribution of botanical folk knowledge in the population. This knowledge is considered the property of older individuals and semi-professional herbal specialists of a community, called Tine-yin-say sayar. For the medicinal uses, there is no direct correspondence between local and current medical disease categories. To avoid this problem, we consulted about the local terms and symptoms of diseases with physicians of the same ethnicity who have been working for several years. The entry of each species includes the Latin binomial, author, plant habit, part used, and general brief uses. Species, genera, and families are arranged alphabetically.

3. Results and discussion
The result of the present investigation indicates the findings of the interaction established with the Dawei and Myeik ethnic groups of Tanintharyi Region in 2017-2018. The 143 ethnobotanical important plant species collected during the present survey belong to 113genera and 55 families.

3.1. Plants and their medicinal application
The present work mainly focused on ethnomedicinal uses of non-timber forest products from the Tanintharyi Region by Dawei and Myeik societies. 55 families, 113 genera and 143 species were recorded as traditionally used medicines. It does not indicate that a species mentioned by only one or two informants lacks value, but it may purely imitate the disappearance of this precise knowledge [6]. Among those species, some are locally restricted; their usable knowledge may be helpful for new findings in the scientific area. Recorded plant species with their scientific name, habit, status, part use, and uses are listed in Table 1. The family name and scientific name are arranged in alphabetical order.

Fabaceae is the most predominant for medicinal uses (12.58%), and it is consistent with the claim as the best-represented floristic family of the region. The members of Fabaceae produce a high diversity of secondary metabolites, which serve as defense compounds against herbivores and microbes [7]. Hence, the knowledge of Tanintharyi local people is rational.

Other predominant families are Rubiaceae (5.59%), Rutaceae and Apocynaceae (4.89%), Annacadiaceae and Moraceae (4.19%), and Annonaceae, Malvaceae, and Myrtaceae (3.49%) respectively. Iridoids, anthraquinones, triterpenes, indole alkaloids, as well as other varying alkaloid subclasses, have shown to be the most common in Rubiaceae family [8]. The leaves of Rutaceae species have monoterpenes and flavonoid aglycones [9]. The members of Apocynaceae, well represented in Southeast Asia, showed a great diversity of alkaloidal structures [10]. The leaves and barks of fifteen species of Anacardiaceae showed the presence of toxic phenols such as catechols, resorcinols, and biflavonoids [11]. The chemotaxonomy of the Moraceae discussed about flavonoids,
flavonoids with isoprenoid substituents, and stilbenes [12]. Therefore, the most widely used bio-resources were considered possible to conduct value-added products.

| S.N. | Scientific name | Common name | Status | Habit | Part used | Uses |
|------|-----------------|-------------|--------|-------|-----------|------|
| A | *Acanthaceae* | | | | | |
| 1 | *Acanthaceae* | | | | | |
| 1.1 | *Avicennia alba* Blume | La-me | Bd | Shrub | leaves | Birth control |
| 1.2 | *Avicennia officinalis* L. | Thamee-laung | Bd | Tree | leaves | Cures ulcer |
| 1.3 | *Rhinacanthus communis* Nees | Htaw-labat | Bd | Herbs | leaves | Antimicrobial, tonic |
| 2 | *Aloaceae* | | | | | |
| 2.1 | *Aloe vera* (L.) Burm.f. | Shazaung-let | Bd, cl | Herbs | leaves | Asthma, carminative, blood purification |
| 3 | *Amaranthaceae* | | | | | |
| 3.1 | *Alternanthera nodiflora* R. Br. | Kanabaw | Bd | Herb | The whole plant | Laxative, skin diseases, anti-inflammatory |
| 4 | *Amaryllidaceae* | | | | | |
| 4.1 | *Crinum asiaticum* L. | Koyan-gyi, | Bd, cl | Herbs | Leaves, bulb | Release swollen, antitoxin |
| 5 | *Anacardiaceae* | | | | | |
| 5.1 | *Anacardium occidentale* L. | Thiho-thayet | cl | Tree | Bark, root, fruit | Tonic, antimicrobial for toothache |
| 5.2 | *Bouea burmanica* Griff. | Mayan | Bd | Tree | Fruits | Hemorrhage diarrhea, appetizer |
| 5.3 | *Buchanania lanzan* Spreng. | Lunpho | Bd | Tree | Roots, fruits, seeds | Blood purification, carminative, laxative, tonic |
| 5.4 | *Mangifera indica* L. | Tha yet | Bd, cl | Tree | Fruits, bark, roots | Astringent, appetizer, tonic, Appetizer |
| 5.5 | *Spondias dulcis* Forst. f. | Gwe-cho | Bd, cl | Tree | Fruit | Appetizer, antimicrobial |
| 5.6 | *Spondia spinata* (L.) Kz. | Gwe | Bd, cl | Tree | Fruit, leaves, bark | |
| 6 | *Acanthaceae* | | | | | |
| 6.1 | *Annona muricata* L. | Duyin-awza | Bd, cl | small tree | Fruit | Tonic |
| 6.2 | *Annona reticulata* L. | Thinbaw-awza | Bd, cl | small tree | Fruit | Tonic |
| 6.3 | *Annona squamosa* L. | Awza | cl | small tree | Fruit | Tonic |
| 6.4 | *Cananga odorata* (Lam.) Hook. f. & Thomson | Saga-sein | Bd/cl | Tree | Flower oil | Headache, joint ache |
| 6.5 | *Miliusa velutina* (Dunal) Hook. f. & Thomson | Tha-butgyi | Bd | Tree | bark | Antitoxin (Scorpion) |
| 7 | *Acanthaceae* | | | | | |
| 7.1 | *Allamanda cathartica* L. | Shwe-pan-new | Bd/cl | Shrub | Bark, leaves, roots | Liver diseases, laxative, antitoxin (snake) |
| 7.2 | *Catharanthus alba* (L.) G. Don. | Thinbaw-ma-thy-o-pan | Bd/cl | Herbs | The whole plant | Control diabetes, antitoxin, hemorrhage dysentery |
| 7.3 | *Nerium indicum* Mill. | New-tha-gee | Bd/cl | Shrub | roots | Pain release, tonic, scabies |
| 7.4 | *Plumeria alba* L. | Tayoksaga | Bd/cl | Tree | flowers | Diuretic, skin diseases, carminative |
| Section | Plant Name | Common Name | Plant Type | Parts Used | Uses |
|---------|------------|-------------|------------|------------|------|
| 7.5     | *Rauvolfia cambodiana* | Pierre ex. Pit. | Shrub | Roots | Apply to cure joint ache externally |
| 7.6     | *Rauvolfia serpentina* (L.) Benth. | Bonma-yaza | Shrub | Roots | Antimicrobial, release hypertension |
| 7.7     | *Thevetia peruviana* (Pers.) Schum. | Set hna yarthi | Shrub | Leaves, roots | Catch cold, easy labor bone |
| 8.1     | *Aglaonema pumilum Hook.f.* | Aseik naing gamon | Herbs | The whole plant | Antidotes for scorpion sting and snake bites |
| 9.1     | *Areca catechu* | Aseik naing | Tree | Fruits | Appetizer, carminative, Diuretic, gonorrhea, Expectorant, laxative, headache |
| 9.2     | *Borassus flabellifer* | Min-baw | Tree | Fruits | Worn healing, diarrheal |
| 9.4     | *Nypa fruticans* Wurmb. | Erawan | Tree | Fruits | Antimicrobial, expectorant, anti-inflammatory, skin diseases, gonorrhea Diuretic, laxative |
| 10.1    | *Cordyline fruticosa* Goep. | Zawgyi taung hmwe | Shrub | Leaves | A decoction of leaves is used orally for cough |
| 11.1    | *Blumea balsamifera* (L.) DC. | Phon-ma-thein | Shrub | Leaves | Paralysis, skin diseases |
| 11.2    | *Eclipta alba* (L.) Hassk. | Kyeik-hman | Herbs | Leaves | Antimicrobial, decongestant, anti-inflammatory, skin diseases, gonorrhea |
| 11.3    | *Chromolaena odorata* L. | Bizat | Herbs | Leaves, roots | Antimicrobial, worn healing |
| 12.1    | *Impatiens balsamina* L. | Dan-pan | Shrubs | Leaves, flowers | Antimicrobial, worn healing |
| 13.1    | *Millingtonia hortensis* L. f. | Egayit | Tree | Leaves, roots | Hypertension; Plague; Stimulating effect on cardiovascular system; Purify blood; gastric ulcers, tumors, respiratory diseases, diabetes, and diarrhea and dysentery |
| 13.2    | *Oroxylum indicum* (L.) Kurz | Kyaung-sha | Tree | Stem bark, fruits, roots | |
| 14.1    | *Bixa orellana* L. | Thi din | Shrub | Roots | Slurry the roots with rice wash water and orally used for asthma |
| 15.1    | *Durio zibethinus* Murray | Duyin | Tree | Fruits | Tonic, Cure insomnia, release stress |
| 16.1    | *Mesua ferrea* L. | Gan-gaw | Tree | Anther | Itching, appetizer, antimicrobial |
| 17.1    | *Canna indica* L. | Budatharan | Herbs | Root | Gonorrhea, demulcent |
| 18.1    | *Crateva religiosa* Forst. F. | Ka dat | Tree | Leaves | Fever |
| 19.1    | *Carica papaya* L. | Thinbaw | Tree | Leaves, fruits | Laxative, anticancer |
| C  | 20. | **Casuarinaceae** | *Casuarina equisetifolia* Forst. | Pinle-kabwe | wd/cl | Tree | Twigs, roots, barks | Anthelmintic, antibacterial, anticancer, astringent |
| C  | 21. | **Clusiaceae** | *Garcinia mangostana* L. | Min-gut | wd/Cl | Tree | Bark, fruit peel | Astringent, worn healing, diarrhea, antimicrobial |
| C  | 22. | **Colchicaceae** | *Gloriosa superba* L. | Simidauk | Wd | Climber | bulb | Expectorant, diuretic, antimicrobial, abortive effect |
| C  | 23. | **Combretaceae** | *Getonila floribunda* Roxb. | Kywet-nwe | Wd | Climber | Stem, leaves | Antimicrobial, astringent, Intestinal worms, fever, ulcer |
| C  | 24. | **Convolvulaceae** | *Ipomoea cairica* (L.) Sw. | Not known | Wd | Climber | leaves | Antimicrobial activity |
| C  | 25. | **Dilleniaceae** | *Dillenia indica* L. | Thabyu | Wd | Tree | fruits | Asthma, astringent, appetizer |
| C  | 26. | **Dipterocarpiaceae** | *Dipterocarpus alatus* Roxb. | Ka-nhyn-phyu | Wd | Tree | Gums, bark | Diuretic, tonic, liver diseases, tumor |
| C  | 27. | **Dracaenaceae** | *Dracaena fragrans* (L.) Ker. Gawl. | Zaw-gyi-taung-hmwe | Wd | Shrub | leaves | Blood vomiting |
| C  | 28. | **Euphorbiaceae** | *Acalypha indica* L. | Kyaung-se-pin | Wd | Herbs | leaves | Emetic, pneumonia, asthma, antimicrobial |
| C  | 29. | **Fabaceae** | *Bauhinia acuminata* L. | Swe-daw | wd/cl | Small tree | Bark, flower, root, leaves | Asthma, antimicrobial activity |
| C  | 29. |  | *Bauhinia monandra* Kurz | Swe daw | wd/cl | Shrub | Leaves, bark | Febrifuge, laxative. |
| C  | 29. |  | *Bauhinia purpurea* L. | Swe daw ni | wd/cl | Shrub | Leaves, bark | Analgesic, antimicrobial |
| Code | Species | Common Name | Part Used | Plant Type | Uses |
|------|---------|-------------|-----------|------------|------|
| D29.4 | *Caesalpinia pulcherrima* (L.) Sw. | Seinban-gale | wd/cl | Shrub | Root leaves, flower, seeds, bark; Abortifacient, antimicrobial, release fever, carminative |
| D29.5 | *Caesalpinia sappan* L. | Teinnyet | WD | Tree | Leaves, barks, wood; Blood purifier, analgesic |
| D29.6 | *Cassia fistula* L. | Ngu shwe | wd/cl | Tree | Fruits, bark; Constipation, common cold, an intestinal disorder |
| D29.7 | *Cassia siamea* Lam. | Mezali | | | Flower, leaves; Analgesic, antihypertensive |
| D29.8 | *Dalbergia kurzii* Prain | Thit pok | WD | Small tree | The whole plant; Decoction use orally for antipyretic |
| D29.9 | *Delonix regia* (Bojer ex Hook.) Raf. | Seinban | wd/cl | Tree | The whole plant; Carminative, expectorant, |
| D29.10 | *Erythrina arborescens* Roxb. | Kathit | WD | Tree | Leaves, roots, bark, flower bark; Expectorant, carminative, diarrhea, release hypertension |
| D29.11 | *Peltophorum terocarpum* (DC.) Back. ex K. Heyne | Thinbaw-mezali | wd/cl | Tree | Antimicrobial, skin diseases |
| D29.12 | *Pterocarpus macrocarpus* Kurz | Padauk | wd/cl | Tree | Gum; Antimicrobial, skin diseases |
| D29.13 | *Senna alata* (L.) Roxb. | Pwe gine mezali | Wd/cl | Shrub | Leaves, seed pod, bark; Purgative, antifungal |
| D29.14 | *Senna timoriensis* DC. | Taung mezali | Wd/cl | Tree | Ant diabetes, anti-inflammatory tonic |
| D29.15 | *Senna tora* L. | Not known | Wd/cl | Herbs | Leaves, roots; Laxative |
| D29.16 | *Sesbania grandiflora* (L.) Poir. | Pauk pan-byu | wd/cl | Tree | Flowers, leaves, fruits leaves; Carminative, expectorant, blood purification, antimicrobial |
| D29.17 | *Tadehagi triquetrum* (L.) H. Ohashi | Lauk-thay | WD | Shrub | Leaves, bark, fruits, seed; Antiallergic, antimicrobial, antibiotic, Antiemetic, antispasmodic, hypoglycemic |
| D29.18 | *Tamarindus indica* L. | Magyi | | | |

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| E30.1 | *Lamiaceae* | Not known | WD | Herbs | The whole plant; Anti-diabetes |
| E31.1 | *Lauraceae* | Ka-ra-way | WD | Small tree | Leases, barks; Anti-inflammatory, digestive system disorder |
| E31.2 | *Cinnamomum multiflorum* Wight. | Ohn-Don | WD | Tree | Anti-inflammatory, digestive system disorder |
| E31.3 | *Litsea glutinosa* (Lour.) C.B.Rob. | Amyauk-san-bin | Wd | Tree | Root bark; Ant diabetes, anti-inflammatory tonic |
| E32.1 | *Couroupita guianensis* Aubl. | Ban Bwe | WD | Tree | Flowers; Antitoxin |
| E32.2 | *Careya arborea* Roxb. | Pan-ei | WD | Tree | leaves; A decoction of leaves is used to cure diarrhea |
| E33.1 | *Lagerstroemia indica* L. | Pyinma-yetthey | Cl | Shrub | Barks, leaves, flower; Release fever |
| No. | Family             | Genus                 | Species                  | Habitat       | Use                                      |
|-----|--------------------|-----------------------|--------------------------|---------------|------------------------------------------|
| 33.2| Lagerstroemia      | Lagerstroemia speciosa| (L.) Pers.               | Saga-war      | Barks, leaves, seeds                     |
|     |                    |                       |                          |               | Laxative, astringent, release fever      |
| 34. | Magnoliaceae       | Michelia champaca     | L.                       | Saga-phyu     | Leaves, flowers, roots, barks, fruits    |
|     |                    |                       |                          |               | Diuretic, heal ulcer, cough, gastric     |
| 34.2|                    | Michelia doltsopa     | Buch Ham.                | Thone-ban-hla | Leaves, flowers                          |
|     |                    |                       |                          |               | Diuretic, heal ulcer, cough, gastric     |
| 35. | Malvaceae          | Hibiscus mutabilis    | L.                       | Khaung-yen    | Flowers, leaves, roots                   |
|     |                    |                       |                          |               | Lung diseases, anti-inflammatory         |
| 35.2|                    | Hibiscus rasa-sensis  | L.                       | Chinbaung-ni  | Leaves, roots                            |
|     |                    |                       |                          |               | Astringent, menstrual diseases           |
| 35.3|                    | Hibiscus sabdariffa   | L.                       | Kara met      | leaves                                   |
|     |                    |                       |                          |               | Diuretic, appetizer                      |
| 35.4|                    | Mansonia gagei        | J. R. Drumm.             | Let-Khote     | wood                                     |
|     |                    |                       |                          |               | Menstrual disorder                       |
| 35.5| Sterculia foetida  |                       | L.                       | Thitto        | Barks, leaves, seeds                     |
|     |                    |                       |                          |               | Diuretic, laxative, carminative, release fever |
| 36. | Meliaceae          | Sandoricum koetjape   | (Burm. f.) Merr.         | Not known     | Bark, fruits                            |
|     |                    |                       |                          |               | Worn healing                             |
| 36.2|                    | Swietenia macrophylla | King.                   | Mahogany      | Fruits,                                |
|     |                    |                       |                          |               | Pesticide                               |
| 37. | Mimosaceae         | Albizia lebbek        | L. Benth.                | Anya-koko     | Barks, leaves                            |
|     |                    |                       |                          |               | Asthma, antimicrobial, anti-inflammatory, cough |
| 37.2|                    | Leucaena glauca       | (L.) Benth.              | Away-yar      | bark                                    |
|     |                    |                       |                          |               | Pain release                             |
| 37.3|                    | Mimosa pudica         | L.                       | Tikayon       | The whole plant                         |
|     |                    |                       |                          |               | Antitumor, hemorrhage dysentery, release kidney stone |
| 38. | Moraceae           | Antiaris toxicaria    | Leschen.                 | Hmya seik     | latex                                   |
|     |                    |                       |                          |               | Cure for toothache                       |
| 38.3|                    | Artocarpus gomeziana  | Wall.                    | Myauk u       | Stem wood                               |
|     |                    |                       |                          |               | Externally use to cure scabies and irritation of the skin. |
| 38.4|                    | Artocarpus heterophyllus | Lam.                     | Peinne        | fruit                                   |
|     |                    |                       |                          |               | Tonic                                   |
| 38.5|                    | Artocarpus rigidus    | Blume                    | Sone-padat    | Fruit, latex                            |
|     |                    |                       |                          |               | Tonic, latex cures dysentery             |
| 38.6|                    | Ficusauri culata      | Lour.                    | Sin tha phan  | Fruits                                  |
|     |                    |                       |                          |               | Ripe fruits are orally used for the tonic of heart  |
| 39. | Moringaceae        | Moringa oleifera      | Lam.                     | Dan-da-lun    | Root bark, leaves, flowers, seeds       |
|     |                    |                       |                          |               | Antimicrobial, carminative, expectorant, skin diseases |
| 40. | Myrtaceae          | Eucalyptus camaldulensis | Dehnh.                | Eucalyp       | leaves                                |
|     |                    |                       |                          |               | inhaler for headache                     |
| 40.2|                    | Eugenia contracta     | Wall.                    | Tha-pyay      | Leaves, bark                            |
|     |                    |                       |                          |               | Hemorrhage dysentery, antimicrobial      |
| 40.3|                    | Psidium acidum Mart.  |                          | Malaka-chin   | Leaves,                                |
|     |                    |                       |                          |               | inhaler for headache, anti-inflammatory |
| No | Family          | Species                        | Synonym | Habitat | Part Used | Medicinal Uses                                           |
|----|----------------|--------------------------------|---------|---------|-----------|---------------------------------------------------------|
| 40.4 | Psidium guajava L. | Malaka                        | wd/cl   | Small tree, fruits, leaves | Appetizer, inhaler for headache |
| 40.5 | Syzygium grande (Wight) Walp. | Thabye-gyi                  | wd/cl   | Tree, leaves, bark, fruits | Hemorrhage dysentery, antimicrobial |
| 41.1 | Ochnaceae        | Ochna wallichiiPlanch.       | Not known | Wd   | Tree, stem | Antimicrobial agent |
| 42.1 | Oleaceae         | Taw-sabe                      | wd/cl   | Climber, flowers | Diabetes, heart disease, skin diseases, toothache |
| 42.2 | Nyctanthes arbor-tristis L. | Seik-hpalu                   | wd/cl   | Small tree, barks, flowers | Expectorant, release cough, skin diseases, fever, liver diseases |
| 43.1 | Averrhoa carambola L. | Zaung-ya                     | Wd/cl   | Small tree, fruits | Tonic |
| 44.1 | Poaceae          | Coixla cryma-jobi L.         | Kyeik pin | Wd | Herbs, rhizome | Externally plaster for a bone fracture |
| 44.2 | Eleochnaceae     | Myae zar myet                | Wd | Herbs, The whole plant | A decoction is used orally for fever |
| 44.3 | Eul-eusine indica (L.) Gaertn. | Myet hna kwa      | Wd | Herbs, The whole plant | A decoction is used orally for urination, kidney diseases, and heart tonic |
| 45.1 | Piperaceae       | Piper betle L.               | Kun     | wd/cl | Climber, leaves | Diuretic, carminative, antitoxin, aphrodisiac, cure cough |
| 45.2 | Piper nigrum L.  | Nga-yok-kaung                | Wd | wd/cl | Climber, fruits | Expectorant, carminative, asthma, stomachache, |
| 46.1 | Rhizophoraceae   | Carallia brachiata (Lour.) Merr. | Mani awga | Wd | Tree, The whole plant | A decoction is used as a bath and orally for menstrual disorder |
| 47.1 | Rubiaceae        | Canthium parviflorum Roxb.   | Say than bayar | Wd | Small tree, roots | Slurried the roots with water and externally apply for rheumatism, dyspepsia, flatulence, nervous disorders, and abdominal pain |
| 47.2 | Gardenia jasminoides J. Ellis | Zi-za-war               | wd/cl   | Shrub, leaves, flowers | Anti-diarrheal, anticancer, anti-dysenteric, |
| 47.3 | Ixora coccinea L. | Pon-na-yake                  | Wd | wd/cl | Shrub, roots, leaves, flowers, barks | Anti-inflammatory and to treat dysentery and tuberculosis, Antimicrobial activity, tonic, febrifuge |
| 47.4 | Ixora congestaRoxb. | Pan-zayeik                   | Wd | wd/cl | Small tree, roots, leaves, flowers, barks | Anti-inflammatory and to treat dysentery and tuberculosis, Antimicrobial activity, tonic, febrifuge |
| 47.5 | Morinda angustifolia Roxb. | Nipar say                   | Wd | Shrub, leaves, stems bark, root bark | anti-inflammatory and anti-oxidative effects, |
| 47.6 | Morinda citrifolia L. | Ye-yo                       | Wd | wd/cl | Small tree, leaves, barks | Anti-inflammatory and anti-oxidative effects, |
| 47.7 | Nauclea cadamba Roxb. | Ma u let tan shay | Wd | Shrub, leaves | Anti-inflammatory and anti-oxidative effects, |
| 47.8 | Renellia speciosa Hook f. | Dawei lee taung myit | Wd | Shrub, roots | Tonic for men, cure rheumatism |
| G | Rutaceae | Aegle marmelos (L.) Correa. | Oak shit | wd/cl | Tree | leaves | A decoction of leaves is used for diarrhea in children and cough, leaves extracts to be applied around the eyes for an eye infection, fruit wall slurry with lime for dysentery |
| 48.1 | Citrus grandis (L.) Osbeck | Kywe kaw | wd/cl | Small Tree | Fruits, leaves | Appetizer |
| 48.2 | Citrus hystrix D.C. | Shauk nu | Wd | Tree | Leaves, fruits | Alcohol extract of fruits apply externally for paralysis, skin diseases, leaves used in cooking for its aroma |
| 48.3 | Citrus limon (L.) Burm. F. | Than-ba-yo | wd/cl | Small tree | Fruits | Antimicrobial, cure lung diseases, pneumonia |
| 48.4 | Citrus medica L. | Shauk | wd/cl | Small tree | Shoots, fruittseeds, | Appetizer, antiemetic, cure asthma, cough, stomachache, |
| 48.5 | Murraya paniculata (L.) Jack. | Yu-za-na | wd/cl | Small tree | Leaves, barks, roots | Cure diarrhea, dysentery, antitoxin, liver diseases, ulcer |
| 48.6 | Zanthoxylum rhetsa (Roxb.) DC. | Thit noe | Wd | Tree | stem | A decoction of the bark is taken internally as a cure for pains in the chest. Bark extract is externally used for stomachache |
| 49. | Sapindaceae | Nepheium lappaceum L. | Kyet-mouk | wd/cl | Tree | fruits | Antimicrobial activity |
| 49.1 | Arytera littoralis Blume | La-Mu | Wd | Tree | fruits | Astringent, worn healing activity |
| 50. | Sapotaceae | Mimusops elengi L. | Khayay | wd/cl | Tree | The whole plant | Astringent, expectorant, toothache, headache |
| 50.1 | Scrophulariaceae | Scoparia dulcis L. | Dana-thukha | Wd | Shrub | The whole plant | Release fever, antiemetic, toothache |
| 51. | Solanaceae | Solanum torvum Sw. | Kazaw-kha | Wd | Shrub | fruits | Antimicrobial activity |
| 52. | Thymelaeaceae | Aquilaria agallocha Roxb. | A-kyaw, Thit-hmwe | Cl | Tree | Gum | Release fever, tonic, skin diseases |
| 53.1 | Verbanaeaceae | Stachytarpheta indica Vahl | Aseik-taya | Wd | Shrub | leaves | Cures ulcer, diarrhea |
| 54. | Zingiberaceae | Alpinia zerumbet (Pers.) B. L. Burtt. & R. M. Sm. | Pa de gaw thay | Wd | Herbs | Rhizomatic roots | Slurry with water and externally applied on stomach and anti-inflammatory |
| 55.1 | Cacuma comosa Roxb. | Na nwin kha | Wd | Herbs | rhizome | Dry powder is mixed with honey and used orally as carminative; externally applied on worm. |

wd = wild; cl = cultivated.
3.2. Plants of non-medicinal uses
Fruits are another source of nutrition that is affluent in vitamins and minerals, and the forest dwellers depend on the seasonal wild edible fruits to meet their needs. During the survey, 26 varieties of wild edible fruits in different seasons throughout the year, were used. Most of the edible plants used were wild vegetables, for example, Cratevareligiosa Forst. F., Dilleniaindica L., Bauhinia acuminata L., Cassia siamea Lam., Sesbaniagrandiflora (L.) Poir., Tamarindusindica L., Hibiscus sabdariffa L., etc. These common wild vegetables in the area could be found in the local markets.

3.3. Bioprospecting associated with forest resources
The focus of bioprospecting in the Tanintharyi Region will be on discovering antimicrobial and antioxidants. It is because of their ability to help prevent, halt, and to repair damage from diseases that are triggered by overactive internal defense reactions in our bodies. Antimicrobial and antioxidants naturally occurring in many plants found in forests could form the basis of new therapies for many diseases [13]. Plant products are used to treat a wide variety of health problems, including fevers, fungal infections, burns, gastrointestinal problems, pain, respiratory problems, wounds, and are used as antidotes to toxins from organisms such as poisonous snakes.

3.4. Bioprospecting the renewable forest resources
A broad range of renewable resources, such as wood and fiber from trees, starch, and other polysaccharides from the plant’s storage organs, are available from the forest. There is constant availability of resources such as grasses, fruits, seeds, barks, shrubs, and other plant parts with medicinal value for human health care. These resources are replenished in the next season by the quick propagation of the plant species by vegetative organs or from the seeds (reproductive organs). They are thus available to utilization in the following year.

In this research, bioprospecting mainly centered on flora from the forest ecosystem of the Tanintharyi region. Flora, especially forest flora found in nature, has been employed for pharmaceutical and phytochemical purposes in different parts of the world for centuries. For example, plants from the family Annonaceae provide many cytotoxic and insecticidal compounds, such as styrylpyrone derivatives, acetogenins, and aporphine derivatives [13]. The pharmaceutical firms and scientists continue to find the useful application of compounds from nature. The economic values of the resources are enormous and beneficial not only the pharmaceutical company but also the host country and indigenous people.

4. Conclusion
In this research, 143 species comprised of 113 genera and 55 families were conducted. Among them, Fabaceae family members are dominant to be used for medicinal purposes; the second dominated families are Rubiaceae, Rutaceae, Anacardiaceae, Apocynaceae, and Moraceae. The majority reported medicinal uses were meant for gastrointestinal disorders, particularly haemorrhoides and colic’s, then dermal wounds and infections, especially infected wounds, urinary and kidney problems, and respiratory troubles. These diseases are assumed to be microbial infections. Hence, the collected data should be continued to discover the antimicrobial activity.

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