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Medicinal and Wild Edible Plants used by Kayin Ethnic People in Myanmar



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Contents

	pages
Abstract	i
စာတမ်းအကျဉ်း	ii
1. Introduction	1
2. Objectives	3
3. Materials and Methods	3
4. Results and Discussion	5
5. Conclusions	14
6. Acknowledgements	14
7. References	15

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Abstract

This study is focused on the medicinal and wild edible plants used by Kayin ethnic people in Myanmar by using ethnobotanical techniques. Traditional practices and knowledge of plants are useful for the improvement of livelihood, not only in rural society but also in modern society. The loss of traditional knowledge concerning the use of plant resources has become a very serious issue. Myanmar is one of the hotspots of biodiversity, and accurate understanding of plant diversity is urgently required. The objectives of this study are; (1) to compile a checklist of medicinal and wild edible plants used by the Kayin Ethnic People and to document traditional knowledge and practices of plant resources in the study area, and (2) to understand the plant diversity of study area. Field surveys were carried out at 8 villages located in the Taungoo, Bago, Tharyarwady, Pyi, and Pha-An District. Group Discussions were carried out to make free listing of useful plant especially for medicinal and wild edible plant. Unstructured interviews and collection of specimens were conducted with the local people. A total 19 species of wild edible plants from 14 families, and 45 species of medicinal plants from 24 families were recorded. The majority of these species were still extracted from the surrounding forests.

Keywords: ethnobotanical techniques, traditional knowledge, Kayin ethnic people, wild edible plants, medicinal plants

ကရင်တိုင်းရင်းသားများအသုံးပြုသည့် ဆေးဘက်ဝင်အပင်များနှင့် သဘာဝသီးပင်စားပင်များ

ဒေါက်တာသန့်ရှင်း^၁၊ ဦးအောင်ဇော်မိုး^၂၊ ရဲလွင်အောင်^၃

^၁ ဒုတိယညွှန်ကြားရေးမှူး၊ သစ်တောသုတေသနဌာန

^၂ သုတေသနအရာရှိ၊ သစ်တောသုတေသနဌာန

^၃ ဦးစီးအရာရှိ၊ သစ်တောသုတေသနဌာန

စာတမ်းအကျဉ်း

ယခုစာတမ်းမှာ ကရင်တိုင်းရင်းသားများအသုံးပြုသည့် ဆေးဘက်ဝင်အပင်များနှင့် သဘာဝသီးပင်စားပင်များအား လေ့လာတင်ပြထားသည့် စာတမ်းတစ်ခုဖြစ်ပါသည်။ ဒေသဖွံ့ဖြိုးတိုးတက်ရေးအတွက် ပတ်ဝန်းကျင်ရှိအပင်များနှင့်ပတ်သက်သည့် ဒေသခံပြည်သူများ၏ ရိုးရာအသိပညာနှင့် ဓလေ့ထုံးစံများမှာ များစွာအရေးပါပါသည်။ ထိုအယူအဆမှာ ကျေးလက်နေပြည်သူများအတွက်သာမက မြို့နေပြည်သူများအတွက်ပါ မှန်ကန်မည်ဖြစ်ပါသည်။ သဘာဝပေါက်ပင်များနှင့်ပတ်သက်သည့် ဒေသခံပြည်သူများ၏ ရိုးရာအသိပညာများနှင့် ဓလေ့ထုံးစံများ ပျောက်ကွယ်လာသည့်မှာ စိုးရိမ်ဖွယ်အခြေအနေသို့ ရောက်ရှိလာပါသည်။ မြန်မာနိုင်ငံသည် ဇီဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းမှုတွင် အရေးပါသည့်ဒေသတစ်ခုဖြစ်ပြီး နိုင်ငံ၏သစ်ပင်ပန်းမန်များ စုံလင်မှုအား လေ့လာရန်များစွာလိုအပ်လျက်ရှိပါသည်။ ယခုစာတမ်း၏အဓိကရည်ရွယ်ချက်မှာ ကရင်တိုင်းရင်းသားများ အသုံးပြုသည့် ဆေးဘက်ဝင်အပင်များနှင့် သဘာဝသီးပင်စားပင်များ အားလေ့လာရန်၊ ကရင်တိုင်းရင်းသားများ၏ ရိုးရာအသိပညာများ၊ ဓလေ့ထုံးစံများများအား လေ့လာရန်ရည်ရွယ်ပါသည်။ သုတေသနလုပ်ငန်းအားတောင်ငူခရိုင်၊ ပဲခူးခရိုင်၊ သာယာဝတီခရိုင်၊ ပြည်ခရိုင်နှင့် ဖားအံခရိုင်ရှိ ကရင်တိုင်းရင်းသား များအဓိကနေထိုင်သည့် ကျေးရွာ(၈)ရွာ အဓိကထားလေ့လာခဲ့ပါသည်။ လေ့လာတွေ့ရှိချက်များအရ ဆေးဘက်ဝင်အပင် (၄၅) မျိုးနှင့် သဘာဝသီးပင်စားပင် (၁၉) မျိုးအား လေ့လာမှတ်တမ်းတင်နိုင်ခဲ့ပါသည်။

Medicinal and Wild Edible Plants used by Kayin Ethnic People in Myanmar

1. Introduction

1.1 A brief review of ethnobotanical study in Myanmar

In this study, the medicinal and wild edible plants used by the Kayin ethnic people is studied with ethnobotanical techniques. Ethnobotany is the discipline related to study of plants concerning with their traditional use and with the management of plant resources viewed from an historical perspective (Pei, Zhang, and Huai 2009). The plant resources are still essential for satisfying the needs of rural community for their daily life (Duchelle 2007).

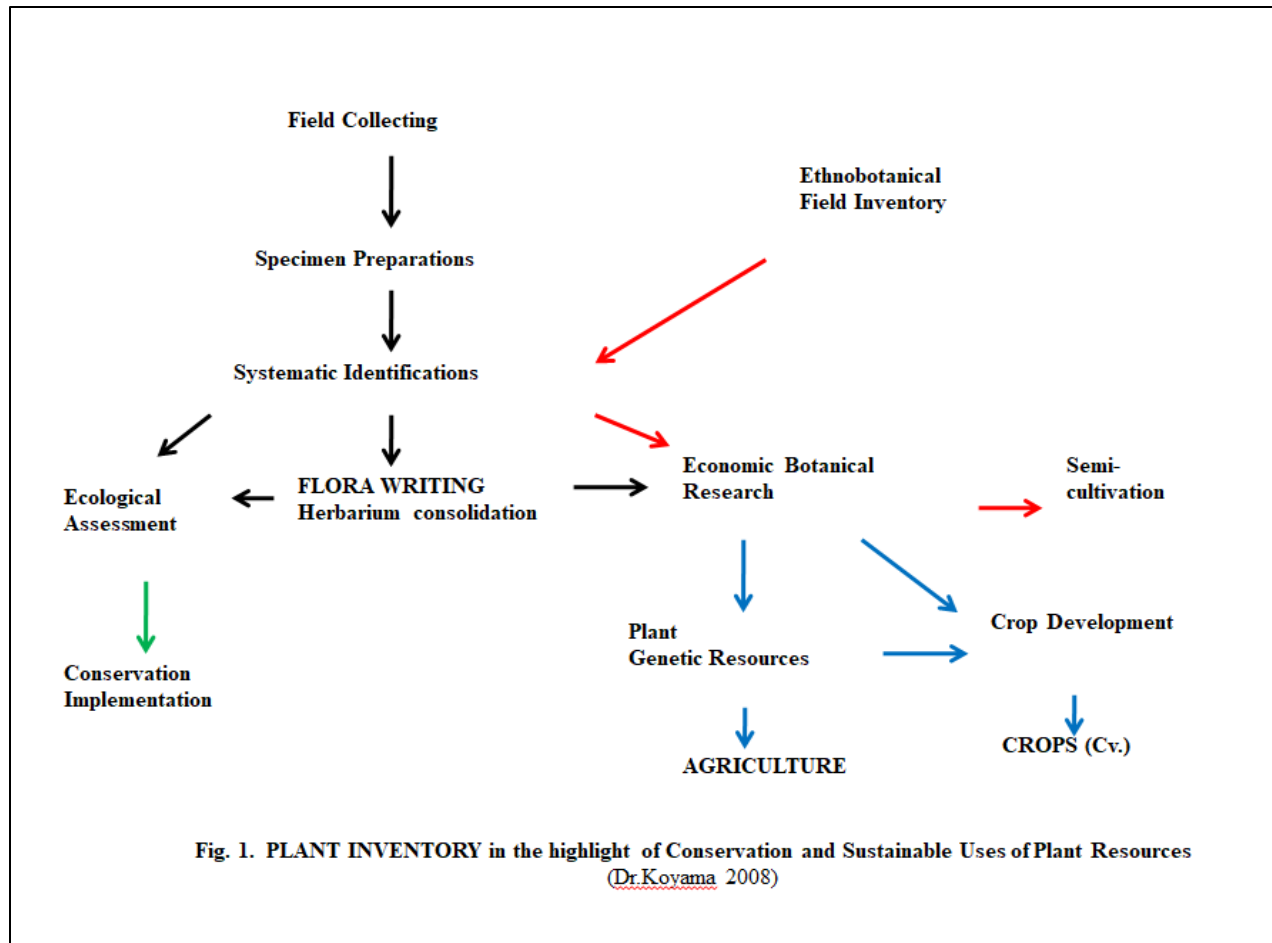
The traditional uses of plant resources and life styles of rural communities have been changed in accordance with the change of subsistence farming/hunting and gathering to profit oriented agricultural systems (Abbet et al. 2014). The local tradition on natural resources is a kind of cultural expressions, and loss of traditional knowledge is also loss of cultural identity (Turner and Turner 2008). However, the cultural association of plants and people is rarely studied, recorded or poorly understood and appreciated (Jain 2000). Through the process of modernization, the loss of traditional knowledge concerning the use of wild plant species has become a very serious issue (Grivetti and Ogle 2000).

Myanmar is one of the hotspots of biodiversity (Myers et al. 2000), (Krupnick and Kress 2003) and is rapidly losing its forests due to increasing development and population growth of the country. Therefore, an accurate understanding of plant diversity in Myanmar is urgently required, and ethnobotanical studies assist in providing new and relevant information on natural plant resources (Hidayati, Franco, and Bussmann 2015), (Rao and Natesh 2008). There are one hundred and thirty-five officially recognized ethnic groups in Myanmar (Ministry of Immigration and Population 2014), and each of these indigenous groups regard natural resources as essential to their culture and well-being (FAO 2010), and the conservation and sustainable use of these resources should be paramount. However, local communities are rarely allowed to participate in decision making process concerning with impact of ecosystem changes, and their dependence on plant resources is not adequately considered in formulating the strategies of rural development (Millennium Ecosystem Assessment 2005). In Myanmar, ethnobotany has been the focus of many studies in recent times, but the emphasis has usually been on medicinal properties and the subsequent financial benefits and incentive for local.

1.2 Medicinal plants

Myanmar has a distinctive system of traditional medicine and some of traditional knowledge are unique to a particular ethnic group (Awale et al. 2006). The use of traditional medicinal practices and knowledge becomes gradually decreased and less popular because of increasing popularity of modern medicines. As a consequence, traditional medicinal knowledge was in danger of extinction (Li et al. 2006). In some cases, the specialized healers did not properly pass on their knowledge to the next generation and keep it to be a secret (Ji, Shengji, and Chunlin 2004). However, the ethnomedicinal studies of plant resources have become interested again for the development of traditional medicinal industry and establishment of ethno-biomedical forest reserve in the recent years (Balick 1996). Traditional medicine has been recognized in a number of countries from Africa, Latin America and Asia in their primary health systems. Therefore, ethnobotanical research became important for documenting the traditional use and knowledge of local communities (Bodeker et al. 2015). Based on the trial-and-error experience, the indigenous communities accumulated the ethnomedicinal knowledge. The ethnomedicinal knowledge was not the result of systematic theory (Chen Bo et al. 2003).

The cultural change and modernization also underpinned the loss of knowledge of medicinal plants. Deforestation and forest degradation also resulted the depletion of the use of medicinal plants (Ji, Shengji, and Chunlin 2004), (Teklehaymanot 2017). Although increased access to formal education resulted more economic opportunities to rural community, they are counterbalanced by decreased understanding of goods and services from nature (Voeks and



Leony 2004). Some of the medicinal plants become rare because of poor harvesting techniques and unsustainable intensities (Ssegawa and Kasenene 2007).

1.3 Wild edible plants

Wild edible plants (WEPs) are defined as plant species collected in the wild to be consumed as food or drink. Although important nutrients for human beings are available from WEPs, it has been argued that the use of WEPs is decreasing in urban style cooking (Leonti et al. 2006), (Reyes-garcía et al. 2015). Being an important source of energy and micronutrient, WEPs can help for the diversification of human diets (Penafiel et al. 2011), (Powell et al. 2015). WEPs are also important food sources during the time of famine when normal food supply was disrupted (Reyes-garcía et al. 2015). Nowadays, humans have focused on relatively few plant species for food neglecting the use of WEPs. It can lead to global food shortage and also to the knowledge erosion about WEPs (Grivetti and Ogle 2000), (Turner et al. 2011). Documentation of WEPs is important for identification of food sources from the surrounding environment and WEPs have potential for development of new crops through domestication for commercial scale (Das, Patra, and Singdevsachan 2016). WEPs are also serving as gene pool for genetic improvement of crops to have higher productivity, disease resistance and compatibility to global climate change (Ju et al. 2013). WEPs have potential for development of new crop through domestication.

2. Objectives

The indigenous societies have different traditions and knowledge about plant resources. Traditional knowledge of plant resources is important not only for the development of rural societies but also for modern societies. For rural societies, traditional knowledge of plant resources is important for poverty alleviation, income generation and subsistence uses (Millennium Ecosystem Assessment 2005). For modern societies, traditional knowledge is important for developing new medicine, genetic improvement of crops and environmental sustainability (Pei, Zhang, and Huai 2009), (Das, Patra, and Singdevsachan 2016). On other hand, traditional knowledge is decreasing because of modernization and globalization (Grivetti and Ogle 2000). Therefore, assessments of subsistence use of plant resource in the local communities become essential for sustainable development of human beings.

This study focused on the plants collected from the wild and home gardens which were used for medicinal and nutritional purposes by the Kayin local communities. Agricultural and commercial crops did not cover in this study. Two aims of this study are 1) to compile a checklist of plants used by the local communities and to document traditional knowledge and practices of plant resources in the study area, and 2) to understand the plant diversity of the study area. The first objective is the mainly discussed

3. Materials and Methods

3.1 Study Area

The field research were carried out at 8 villages located in the Taungoo, Bago, Tharyarwady, Pyi, and Pha-An District, namely, Budalin, Phar-o, Hyaingyu, Shwetaung Ngwetaung, Tawpyarkyi, Thapyaynu, Thitkwataung, Zale. The villages, in which Kayin ethnic people were residing as major ethnic people, were carefully selected with the aim to gather their traditional knowledge about plant resource.

3.2 Interviews, collection of plant specimens and identification

The ethnobotanical survey was conducted in the study area from August, 2020 to September, 2022. First, group meetings were organized with villagers and explained the objectives of our research. Consent was taken before carrying out ethnobotanical survey. The ethical guidelines of the International Society of Ethnobiology were strictly adhered to (International Society of Ethnobiology 2006). A total of 78 participants involved in the group meeting and interview. The ages of participants range from 22 to 76 years. From the initial group meetings, free listing of useful plants were compiled. Unstructured interviews were also conducted with the villagers about their traditional use of plants, especially wild edible plants, medicinal plants. The information of useful plants was gathered with the method of “walk-in-the-wood” together villagers (Phillips and Gentry 1993). The plant specimens were also collected together with villagers. Some of the common species were identified in the field. Some of the specimens were identified by requesting to family specialist of Forest Research Institute, Makino Botanical Garden (Japan) and Xishaungbana Botanical Garden (China). Most of the specimens were identified by the listed researchers of this study. The plant descriptions were consulted in the Flora of China and Flora of Thailand. The scientific names for species are assigned in accordance with Plants of the World Online (<https://powo.science.kew.org>).

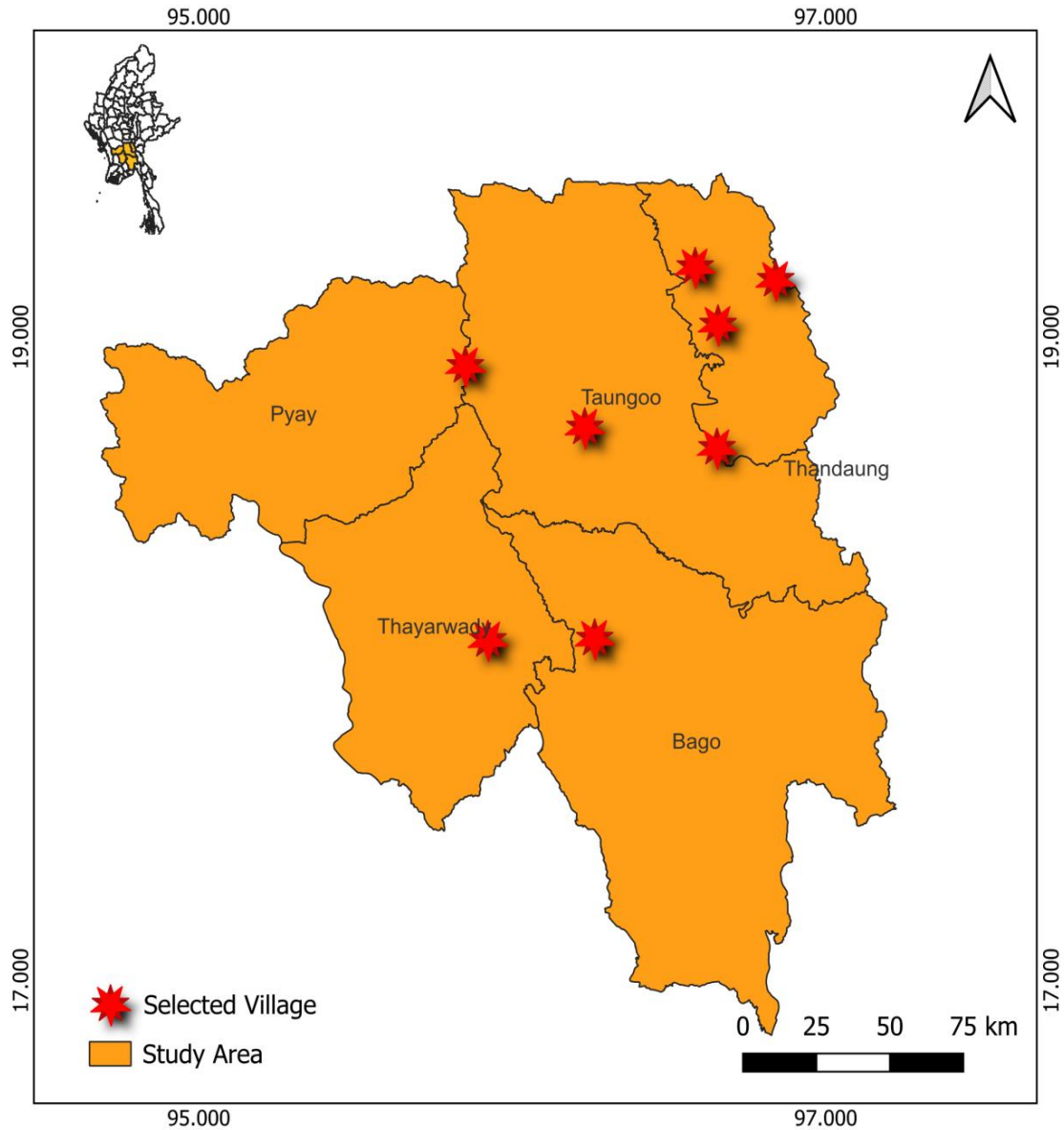


Fig.2. Map of study Area

4. Results and Discussions

4.1 Medicinal Plants

A total of 45 species from 24 families was used as medicinal plants for various disorders. Phyllanthaceae (4 species), Lamiaceae (species) are most useful plant families, followed by Asteraceae (3 species), Fabaceae (3 species) Zingiberaceae (3 species) and orchidaceae (3 species) and Rutaceae (3 species). Most of the species were still collected from the surrounding forest and embankments of farmlands. The most commonly used species is *Rothea serrata* mainly used for postpartum care.

4.1.1 *Plants used for birth related disorders*

The leaves of *Blumea balsamifera*, *Celastrus monospermus*, *Croton oblongifolius* were used for herbal bath at postpartum period. The local people in Thantaung Township mostly used the leaves of *Blumea balsamifera* for herbal bath, however the local people from Oatwin Twonship prephared *Croton oblongifolius*. The cream of root consumed orally at postpartum period in Thandaung Township.

4.1.2 *Plants used for Circulatory System Disorders*

Two species were reported to be used for circulatory system disorders. The cream of the root of *Leptadenia reticulate* was consumed orally for hypertension. The decoction of the bulb of *Cheilocostus speciosus* were also consumed orally for the same disorder. .

4.1.3 *Plants used for Digestive System Disorders*

A total of 8 species was used for digestive system disorders such as abdominal pain, diarrhea, hemorrhoids, retention of gasses in bowel, The white sap from stem of used externally for hemorrhoids. The tender shoots of *Cratoxylum cochinchinense* were consumed as salad for abdominal pain. *Cratoxylum cochinchinense* is very common species in the forest of Taugoo, Bagoo, Tharyarwady, and Pyay districts. The dection of whole plant of *Phyllanthus urinaria* consumed orally for hepatitis diseases.

4.1.4 *Plants used for Endocrine System Disorders*

Two species of lamiaceae, *Vitex altissima* and *Vitex glabrata* were reported to be used for diabetes. The decoction of bark of *Vitex altissima* was consumed orally for diabetes. The dry leaves of *Vitex glabrata* used as tea leaves and consumed orally for diabetes.

4.1.5 *Plants used for general health being*

Two species were reported to be used for general wellbeing of local people. The dry leaves of *Tadehagi triquetrum* were used as tea leaves and consumed orally for good stamina. The solution obtained from the rhizome of *Alpinia nigra* was used orally as tonic drink.

4.1.6 *Plants used for Genitourinary System Disorders*

A total of 5 species were used for genitourinary system disorders, such as, bladder stone, menstrual disorders and other urinary diseases. The decoction of leaves of *Evolvulus nummularius* and *Alysicarpus rugosus* were consumed orally for bladder stone. The decoction of bulb of *Nervilia plicata* with tody palm sugar for irregular menstruation. Dry leaves of *Alysicarpus vaginalis* were used as tea leaves and consumed for urinary diseases. The solution obtained from the mixture of fruits of *Argyreia barbigera*, palm sugar, and water consumed orally for less urine and discomfort in upper abdomen after eating.

4.1.7 *Plants used for infection/ infectation*

A total of four species were used for various infections, such as, fever, infantile ailment, and malaria. The malaria is very common diseases in the study area, especially the villages near to the forest area.

4.1.8 *Plants used for Injuries*

Two species of vitaceae, *Cayratia trifolia*, *Cissus javana* were used for various injuries and burn. The paste of leaves of *Cayratia trifolia* were used over injuries and burn. The decoction of *Cissus javana* bulb mixed with salt and used over knife injury.

4.1.9 *Plants used for neoplasms*

A total of 3 species was reported to be used for the treatment of neoplasms with different methods of application. The boiled bulbs of *Dioscorea* sp (Nwar-kyaung-thar-pan) were consumed as food for cancer. The Shoots of *Hymenodictyon orixense* cooked as vegetable dish and consumed for cancer. The bulb of *Stemona burkillii* consumed with honey for cancer

4.1.10 *Plants used for nervous system disorders*

Only one species of Rutaceae, *Citrus medica* was reported for the treatment of paralytic stroke. The distilled liquid of one viss of fruits with suitable amount of leaves was used as lotion for paralytic stroke. The cream of root mixed with alcohol was also used as lotion for stroke.

4.1.11 *Plants used for respiratory system disorders*

A total of 3 species was reported to be used for respiratory system disorders. The decoction of leaves *Canthium horridum* was consumed orally for cough and feeling congested in the chest. The leaf juice of *Scoparia dulcis* and *Ocimum tenuiflorum* were mixed with salt and consumed orally for cough

4.1.12 *Plants used for sensory system disorders*

Only one species of Tectariaceae, *Tectaria herpetocaulos* was used for sensory system disorders. The cream of root used externally for othorrhoea. It was also applied to various types of sores.

4.1.13 *skin/Subcutaneous Cellular Tissue Disorder*

A total of 7 species was reported to be used for various skin diseases. The paste of fruits of *Eulophia alta* used externally over ringworm. The decoction of fruits of *Clausena anisata* was applied over scabies. The Paste of leaves of *Scoparia dulcis* and *Ageratum conyzoides* were used over sores.

Table1. Medicinal Plants used by Kayin Ethnic People

Sr.No	Ailment Category	Particular Disease	Local Name	Family	Scientific Name	Application	Collection Number(TS)
1	Birth Related Disorder	postpartum Care	Phone-ma Thain	Asteraceae	<i>Blumea balsamifera</i> (L.) DC.	Leaves boiled with water, and solution used for herbal shower for postpartum care	field identification
2			Kyat-tet	Celestraceae	<i>Celastrus monospermus</i> Roxb.	Leaves boiled, and liquid used in shower at post partum period after 3 months	1615
3			Thet-yin-gyi	Eupobiaceae	<i>Croton oblongifolius</i> Roxb.	leaves boiled, and liquid used in shower at post partum period.	1595
4			Yinbyar apyar, Kwaetethoe	Lamiaceae	<i>Rotheca serrata</i> (L.) Steane & Mabb.	Cream of root consumed orally at postpartum period	1561
5	Circulatory System Disorder	Hypertention	Kumon, Gon-khar	Apocynaceae	<i>Leptadenia reticulata</i> (Retz.) Wight & Arn.	Cream of root used orally for hypertensiion	1624
6			Pha-lan-taung-way	Costaceae	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Decotition of bulb consumed for hypertention	1611
7	Digestive System Disorder	Abnominal pain	Bae-pyar	Hypericaceae	<i>Cratoxylum cochinchinense</i> (Lour.) Blume	Tender shoots consumed as salad for abdominal pain	1639
8		Diarrhea	Sein-na-baw	Smilacaceae	<i>Smilax quadrata</i> A.DC.	Cream of root consumed orally of diarrhea	1637
9		Hemorrhoids	Seik-noe-pin	Eupobiaceae	<i>Euphorbia hirta</i> L.	white sap from stem used externally for hemorrhoids	1603
10		Hepatitis disease	Taw-zee-phyu	Phyllanthaceae	<i>Phyllanthus urinaria</i> L.	Decction of whole plant consumed orally for Hepatitis disease	1589
11		Retention of gasses in bowel	Thakarla	Rutaceae	<i>Vepris bilocularis</i> (Wight & Arn.) Engl.	Dry leaf powder consumed orally for rention of gasses in bowel	1563
12		Stomach ache	Kyauk-gyin-sein	Zingiberaceae	<i>Zingiber sadalonii</i> Triboun & K.Larsen	Rhizome consumed orally for stamach ache	1631
13		Toothache	Kha-yan-kazot	Solanaceae	<i>Solanum torvum</i> Sw.	Dry fruit powder mixed with wax, prepared as cegar, keep the gas of cegar in mouth, not breath in, and open the mouth in the bowl of water, for toothache.	1591
14			Sin-kayan	Solanaceae	<i>Solanum viarum</i> Dunal	Dry fruit powder mixed with wax, prepared as cegar, keep the gas of cegar in mouth, not breath in, and open the mouth in the bowl of water, for toothache.	1579
15	Endocrine System Disorder	Diabetes	Tauk-tae-lat-war	Lamiaceae	<i>Vitex altissima</i> L.f.	decoction of bark consumed orally for diabetes	1635
16			Kyat-lel-san	Lamiaceae	<i>Vitex glabrata</i> R.Br.	Dry leaves used as tea leaves and consumed orally for diabetes	1592
17	General Health and Well-being	Tonic	Laut-min	Fabaceae	<i>Tadehagi triquetrum</i> (L.) H.Ohashi	Dry leaves used as tea leaves and consumed orally for good stamina	1593
18	Genitourinary System Disorder	bladder stone	Kyauk-kwae	Convovulaceae	<i>Evolvulus nummularius</i> (L.) L.	Decoction of leaves consumed orally for bladder stone	1618
19			Nwar-hta-min	Fabaceae	<i>Alysicarpus rugosus</i> (Willd.) DC.	decoction of leaves consumed orally for bladder stone	1619
20		Irreglar menstruation	Tha-pin-shwe-htee	Orchidaceae	<i>Nervilia plicata</i> (Andrews) Schltr.	Decoction of bulb with tody palm sugar for irregular menstruation	1623
21		menstrual disorder	Shar-phyu	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	decoction of bark consumed orally for mensural disorder	1606
22		Urinary Diseases	Than-manaing-kyauk-manaing	Fabaceae	<i>Alysicarpus vaginalis</i> (Linnaeus) Candolle	Dry leaves used as tea leaves and consumed for urinary diseases	1582

Table 1. Medicinal Plants used by Kayin Ethnic People (cont:)

Sr.No	Ailment Category	Particular Disease	Local Name	Family	Scientific Name	Application	Collection Number(TS)
23	Infection/infection	(1) Fever (2) Malaria	Shan-sae-khar	Urticaceae	<i>Debregeasia</i> sp.	decoction of whole plant consumed orally for fever and malaria	1636
24		ailment and sore throat	Dayinkauk	Shizaeaceae	<i>Lygodium venustum</i> Sw.	decoction of root consumed orally for ailment and sore throat	1638
25		infantile ailment	Khwaie-thae-pan, Naw-nae-thee	Asteraceae	<i>Ageratum conyzoides</i> L.	Leaf extract mixed with salt, consumed orally for infantile ailment	1612
26		Malaria	Thit-thet-gyin, Tha-aye-to	Zingiberaceae	<i>Hedychium spicatum</i> Sm.	Young shoot consumed as salad with rice for malaria	1590
27	Injuries	burn	Htaw-pat-kyi-kyauk	Vitaceae	<i>Cayratia trifolia</i> (L.) Domin	Paste of leaves used over injuries and burn	1620
28		Knife injury	Tapintaing-myanan	Vitaceae	<i>Cissus javana</i> D C.	Decoction of bulb mixed with salt and used over knife injury	1580
29	Neoplasms	cancer	La-thar, Nwar-kyauung-thar-pan, War Yaung Pan	Dioscoreaceae	<i>Dioscorea</i> sp.	boiled bulb consumed as food for cancer	1625
30			Khu-san	Rubiaceae	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Shoot scooked as vegetable dish and consumed for cancer	1594
31			Tha-myar-ne	Stemonaceae	<i>Stemona burkillii</i> Prain	bulb consumed with honey for cancer	1608
32	Nervous System Disorder	Paralytic Stroke	Taw-shauk, Shauk-tha-kwar	Rutaceae	<i>Citrus medica</i> L.	Prepared distilled liquid of one viss of fruits with uitable amount of leaves used as lotion for paralytic stroke. cream or root mixed with alcohol and used as lotion for stroke	1578
33	Respiratory System Disorder	(1)Coach (2) feel congested in the chest	Ayeik-ma-htoe	Rubiaceae	<i>Canthium horridum</i> Blume	decoction of leaves consumed orally for coach and feel ing congested in the chest	1629
34		Coach	Tha-gyar-pin	Scopariaceae	<i>Scoparia dulcis</i> L.	Leaf juice mixed with salt or honey, and taken orally for coach	1599
35			Kalar Pinsein	Lamiaceae	<i>Ocimum tenuiflorum</i> L.	Leaf juice mixed with salt and taken orally for coach	1558
36	Skin/Subcutaneous Cellular Tissue Disorder	ringworm	Pan-late-pyar	Orchidaceae	<i>Eulophia alta</i> (L.) Fawc. & Rendle	paste of fruits used externally over ringworm	1605
37		scabies	Tha-pu-mu	Rutaceae	<i>Clausena anisata</i> (Willd.) Hook.f. ex Benth.	boil liquid of fruits used for scabies	1621
38		Sore	Tawpnaphu, Nawnattee	Asteraceae	<i>Ageratum conyzoides</i> Sieber ex Steud.	Paste of leaves used over sore.	1559
39			Pa-that-sar	Orchidaceae	<i>Calanthe</i> sp.	Cream of bulb used over sore	1610
40			Nawsaaye	Scopariaceae	<i>Scoparia dulcis</i> L.	Paste of leaves used over sore.	1560
41		Tumor	Nagamauk	Sapindaceae	<i>Dimocarpus longan</i> Lour.	Cream of root used externally over tumor	1640
42	skin/Subcutaneous Cellular Tissue Disorder, Sensory System Disorder	Sore	Shan-kin-kaung	Tectariaceae	<i>Tectaria herpetocaulos</i> Holttum	(1)Cream of root used over sore, (2) cream of root used externally for othorrhoea	1581
43	Digestive System Disorder, Circulatory System Disorder	liver and heart disease	Lel-gyar-zee-phyu, Shar-phyu	Phyllanthaceae	<i>Phyllanthus urinaria</i> L.	dection of whole plant with tody palm sugar consumed orally for liver and heart diseases.	1600, 1602
44	Digestive System Disorder, Genitourinary System Disorder	Less Urine, Discomfort in upper abdomen after eating	Pan-hmauk-khon	Convolvulaceae	<i>Argyrea barbigera</i> Choisy	The solution obtained from the mixture of fruits, palm sugar, and water consumed orally for less urine and discomfort in upper abdomen after eating	1604
45	Genitourinary System Disorder, General Health and Well-being	Dysuria, Tonic	Gon-min	Zingiberaceae	<i>Alpinia nigra</i> (Gaertn.) Burt	rhizome used orally as diuretic and tonic.	1598



Fig.3. A, *Tectaria herpetocaulos*. B, *Hedychium spicatum*. I C. *Lygodium venustum* D. *Stemona burkillii* E. *Hymenodictyon orixense* F. *Cheilocostus speciosus*

4.2 Wild Edible Plants

A total of 19 species from 14 families has been recorded as wild edible plants. Zingiberaceae, Phyllanthaceae, Sapindaceae are most common families as wild Edible Plants. Most of the species are indigenous species in Myanmar. However, only one species, *Crassocephalum crepidioides*, is an exotic species.

Different parts of plants are used for various purpose for WEPs. In most of the WEPs, young stems, leaves, flowers fruits, seeds are consumed. Villagers collected WEPs mostly for their own consumption. Not a single species was reported to sell at the local market. However, the villagers from Pha-o village, allow free of charge for their friends to collect some WEPs in their farm.

4.2.1 Vegetables

A total of 12 species from 11 families was used as vegetables. According to the interviews with villagers, the most common species used as wild vegetables were *Thelypteris subpubescens*, *Hellenia speciosa*, *Momordica dioica*, *Dioecrescis erythroclada*, *Lygodium venustum*. The fresh flowers of *Paederia foetida* were consumed as salad with rice, the only species of which the flowers were used as vegetable.

At Pha-o village, the villagers conserved the *Dioecrescis erythroclada* in their farm land as a food tree, and the fruit was used to cooked as vegetable dish. They name the fruit as green potato. They also allow free of charge for their friends from nearby city to collect the fruits of *Dioecrescis erythroclada*.

The different methods of preparation of vegetable for traditional dishes are as follow: (i) *Hin*, the most common traditional food, is prepared by boiling together the vegetable with edible oil, fermented fish and salt into a semi-liquid dish; (ii) *Akyaw* is prepared by frying the vegetable together with salt, spices, chili, and fermented fish; (iii) *Athote* is prepared by mixing raw or boiled vegetable with pounded fried groundnut, salt and chili; (iv) *Atoe* is a raw salad eating together with fermented fish, or with fermented beam; (v) *Hincho* is a soup prepared by boiling the vegetable together with fermented fish and salt.

4.2.2 Fruits and Nuts

Two species of Sapindaceae were reported as fruit plants. The fruits of *Schleichera oleosa* and *Dimocarpus longan* were reported as villagers collected from the wild consumed as snack fruits. The planting of these fruit trees were not observed in their home garden or farm land.

4.2.3 Spices and Condiments

One species of lauraceae and one species of Zingiberaceae were reported as plants used as species and condiments. The young leaves of *Laurus nobilis* were used as spices in traditional curry for flavoring ingredient. The seeds of *Amomum subulatum* were also used as species. *Amomum subulatum* is an indigenous species of Myanmar, and nowadays the species is extensively cultivated for commercial purpose.

4.2.4 Children Snack

The children from Zale village, Thandaung Township were used to collect the ripe fruits of *Ficus ulmifolia* and consumed as snack. At Phar-o village, Kyaukthadar Township, children used to collect the fruits of *Antidesma buniis* as snack. The other villages did not report the species which were used for children snack.

Table 2. Wild Edible Plants used by Kanyin Ethnic People

Sr.No	Use Category	Local Name	Scientific Name	Family	Preparation	Collection Number (TS)
	Vegetable	Dayinkauk	<i>Thelypteris subpubescens</i> (Blume) K.Iwats.	Aspleniaceae	Young leaves for vegetable dish	1564
1		Thaehmonnyin	<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	Asteraceae	Young leaves for vegetable dish	1565
2		Wat-kyut	<i>Murdannia divergens</i> (C.B.Clarke) G.Brückn.	Commelinaceae	Tender stem and shoot as salad	1633
3		Pha-lan-taung-way	<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta	Costaceae	Tender Shoot Cooked as Vegetable dish	1611
4		Kyat-hin-nyunt	<i>Momordica dioica</i> Roxb. ex Willd.	Cucurbitaceae	Tender Leaves as vegetable	1597
5		Bae-pyar	<i>Cratogeomys</i>	Hypericaceae	Tender Shoot Cooked as Vegetable dish	1639
6		Phat-yar (Gwa-lel)	<i>cochinchinense</i> (Lour.) Blume	Lamiaceae	Tender leaves prepared as salad	1575
7		Kinbalin	<i>Clerodendrum colebrookianum</i> Walp.	Phyllanthaceae	Young leaves cooked as soup	1630
8		Hti-pha-in-naw,	<i>Antidesma buniis</i> (L.) Spreng.	Rubiaceae	Fresh flower consumed as salad with rice	1622
9		Khwa-e-pote-new	<i>Paederia foetida</i> L.	Rubiaceae	Fruits cooked as vegetable dish	1614
10		Mat-taw, Hman-pin	<i>Dioecresis erythroclada</i> (Kurz) Tirveng.	Shizaeaceae	Tender leaves prepared as vegetable dish	1607
11		Kauk-Kauk-Nyunt	<i>Lygodium venustum</i> Sw.	Zingiberaceae	Fresh fruits as salad, and also cooked as vegetable dish	1632
12		Kyat-Chan	<i>Zingiber cernuum</i> Dalzell	Zingiberaceae	Tender Shoot Cooked as Vegetable dish	1566
13		Tawgin	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Sapindaceae	Fruits edible	1616
14	Fruits and nuts	Gyo	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Fruits edible	1640
15		Nagamauk	<i>Dimocarpus longan</i> Lour.	Lauraceae	Young leaves used as spice	1586
	Spices and Condiments	Tone-lu-tet, Metkhar-ayaine, Mote-soe-ngayoke	<i>Laurus nobilis</i> L.	Zingiberaceae	Fruits used as spices	1567
16		Chinpaungphala	<i>Amomum subulatum</i> Roxb.	Phyllanthaceae	Ripe Fruits as children snack	1628
17	Children snack	Kinbalin	<i>Antidesma buniis</i>	Moraceae	Ripe Fruits as children snack	1574
18		Kha.aung	<i>Ficus ulmifolia</i> Lam.			
19						



Fig 4. A, *Dioecrescis erythroclada*.
B, The fruits of *Dioecrescis erythroclada*.
C, *Zingiber cernuum*

5. Conclusions

A rich diversity and traditional knowledge of medicinal and wild edible plants used by Kayin ethnic people have been documented in this study. Most of these useful plants are still extracted from surrounding natural forest and embankments of farm land.

The Local food consumption was still depending on the wild edible. Some of the food tree, such as *Dioecrescis erythroclada* was conserved on the firm land and the fruits were consumed as vegetable. It was a good example of sustainable utilization and conservation. Some medicinal plants (e.g. *Alpinia nigra*) were reported to be used as diet food for general wellbeing.

It was observed that *Stemona burkillii*, a very high demanding species for the treatment of cancer was growing naturally in the deciduous forest of study area. *Hymenodictyon orixense*, which is a very dominant species in the study area, was used as food for medicine especially for the treatment of cancer. The local people reported that some species, such as, *Tectaria herpetocaulos*, have high market demand as raw material for medicinal use, and become rare in the natural forest. Further studies on photochemistry and pharmacology of plant resources are suggested to encourage sustainable utilization of plant resources.

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