



Plant Diversity and Utilization of Medicinal Plants by Traditional Healers

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Abstract

The research was a survey of the diversity of medicinal plants in the Polsongkram Community Forest, Nonsung District, Nakhon Ratchasima, in tandem with a qualitative research program to assess of these medicinal plants and products, conducted by interviewing local medicinal healers.

The diversity survey was carried out in 2015 and 2016, resulting in the identification of 18 species and 21 families of medicinal plants in the Polsongkram Community Forest, with 23 different medicinal plants identified, mostly in the family Caesalpiniaceae and Dipterocarpaceae. A diversity index of 0.91, with an evenness index of the plants of 0.29, were calculated. *Sindora* (*Sindora siamensis* Teijsm. ex Miq.) is the most important contribution to these indices, and has been long considered to be an important medicinal plant for the ecological system and a very influential plant for the community forest, having been traditionally used for producing medicinal products for health care by the local healers, who have created and are producing 20 medicinal products. This study is an important contribution to the raising of the local people's self-awareness in conserving and increasing the sustainability of the medicinal plants in their community.

Keywords: variety of herb biodiversity, local intelligence, medicinal plants

Introduction

Polsongkram Community Forest is a deciduous dipterocarp forest with *Shorea obtusa* Wall. ex Blume, located in the north of Nakhon Ratchasima. Its geological structure consists of two types of rocks, Makasarakam Rock (Ktms), which consists of sedimentary rock and metamorphic rock in the same era of Khorat Rock, which is about 146 million years old, as well as Cretaceous sedimentary rock, about 1.8 million years old. The soil type commonly found in the area is Jaturat soil, with a spread of rock salt soil from eroded rock salt, with moderate alkaline value. The soil with the salt crystallization is called by the local term "Din Acid" (Rattanapotanan, 2014). Ban Nong Hau Rat Village is in the middle of the Polsongkram Sub-district, where local people make use of the biological diversity of plants in this community forest by collecting the edible parts of plants and trees. Plants, vegetables, and fruit, including Pak Tiew or *Cratoxylum*, Pak Waan or *Melientha*, Sadoa or *Azadirachta*, Bamboo shoots or *Bambusa*, and mushrooms, are a food resource. Wood is also cut from the community forest for building their houses. They also illegally cut wood to burn for charcoal as fuel for cooking.

The local healers make use of the community forest by collecting medicinal plants to be used in health care and treatment of various illnesses. The healers apply their local wisdom and knowledge handed down from generation to generation. These medicinal plants include Vetivergrass, Apocynaceae, Stemonaceae, *Cassythafiliformis*, *Micromelum minutum*, *Casariagrewiaefolia*, *Passiflora foetida*, *Strychnos nux-blanda*, *Sindora*, *Shorea*, *Walsura*, *Phyllanthus*, *Buchanania*, *Cratoxylum*, *Buchanania*, *Plerocarpus*, *Catunaregam*, *Heterophragma*, *Dalbergia*, *Alangium*, *Azalia*, *Ellipanthus*, *Zanthoxylum* and *Albizia*. (Rattanapotanan, 2013).



In our study, we investigated the way in which local healers pass on their knowledge of the use of medicinal plants, and add more value to medicinal products from the common plants found in the community forest, and create a data base of information on the medicinal value of these various plants, and their use as alternative treatments in Thai traditional medicine. We also studied their plans for plant conservation and their desire to revive Polsongkram Community Forest as a more plentiful resource. A intended outcome of our research is to raise the local people's awareness of the benefits of increasing the value of these products, and planning ways to achieve this, by conserving the community forest and developing better medicinal community products from the plant resources in the forest.

Objectives of the Study

1. To study the biological diversity of medicinal plants in Polsongkram Community Forest, Nonsung District, Nakhon Ratchasima.
2. To compile knowledge of the medicinal quality of the essence these plants in order to make a wider range of medicinal products for improvement in public health and the treatment of illness, based on the local healers' wisdom and knowledge of these plants.

Methods and Materials

This operational research is an integrated study including a bio-ecological survey of the forest area, and a qualitative study using focus group discussions, questionnaires, and in-depth interviews, with local healers who are competent in using medicinal plants. The five local healers participating in the study were registered and recorded as alternative local healers at the Polsongkram Public Health Promotion Hospital.

This research also included the study of making use of medicinal products for curing a variety of sicknesses based on the local healers' culture and wisdom. The variable of the study is the knowledge indicate similarity index used in this studies concerning applying local healers' wisdom of using medicinal plants in Polsongkram Community Forest, Nonsung District, Nakhon Ratchasima for health promotion and sickness treatment. The second part of the research is an operational study of surveying bio-diversity of medicinal plants by collecting data from 8 experimental plots with the size of 40x40 meters as an example for studying plant community and also the data collected from 8 smaller experimental plots with the size of 10x10 meters. A species list was made for recording common plant names using Krebs' calculation method- Krebs (1972) for evaluating the important value index of medicinal plants, the index of plant diversity (Shannon-Wiener's Index Diversity, H), the index of plant richness (Richness : R), the index of plant evenness (Evenness), and the index of similarity. Also, it included the operational study of the use of medicinal plants for producing local drug for the evaluation.

Results of the Study

1. Diversity of medicinal plants in the Polsongkram Community Forest the results was shown in table 1 and table 2. In table 1, it was found that there were 23 plant types, 18 species, and 21 families and Table 2



shows the variety of 23 types of medicinal plants, with Caesalpiniaceae being the main species, which included Makkhatae (*Sindora siamensis* Teijsm. ex Miq.) Khee Lek Baan (*Sennagarrettiana* (Craib) Irwin & Barneby) and Makha Mong (*Afzelia xylocarpa* (Kurz) Craib). The second most common plants were of the species of Dipterocarpaceae, including Teng (*Shoreaobtusa* Wall. ex Blume) and Yang Gard (*Shoreaobtusa* Wall. ex Blume). The results of our study show the diversity index of the trees is 0.91 and the index of evenness is 0.29. Among other trees in the forest, *Sindora* is the most important index of this type of forest. Its index is 84.18. For *Walsura* and *Buchanania*, there are 10 of each growing per rai. The density of *Buchanania*, *Plerocarpus*, *Catunaregam*, *Dipterocarpus* and *Cratoxylum* is 6 per rai. *Heterophragma*, *Dalbergia*, *Alangium*, *Afzelia*, *Zanthoxylum*, *Albizia*, *Ellipanthus*, and *Zanthoxylum* are the least dense, at 2 per rai. *Shorea* has an index value of 67.20 and *Phyllanthus* has the index value 18.42. The most common type of trees found in the forest are *Sindora* (110 trees per rai). *Sindora* is the tree with the highest relative density of 34.59. *Shorea* and *Phyllanthus* are the next ones available in the forest are.

Table 1 Types of Medicinal Plants

Rank	Common names	Scientific Name	Family
1	Makha Tae (<i>Sindora</i>)	<i>Sindora siamensis</i> Teijsm. ex Miq.	Caesalpiniaceae
2	Teng (<i>Shorea</i>)	<i>Shoreaobtusa</i> Wall. ex Blume	Dipterocarpaceae
3	Makham Pom (<i>Phyllanthus</i>)	<i>Phyllanthusemblica</i> Linn.	Euphorbiaceae
4	Gut Lin(<i>Walsura</i>)	<i>Walsura trichostemon</i> Miq.	Meliaceae
5	Srithanonchai(<i>Buchanania</i>)	<i>Buchanania siamensis</i> Miq.	Anacardiaceae
6	Mamuang Hau Mangwan(<i>Buchanania</i>)	<i>Buchanania lanzan</i> Spreng.	Anacardiaceae
7	Pradu (<i>Plerocarpus</i>)	<i>Plerocarpus indicus</i>	Fabaceae
8	Khee Lek Ban(<i>Senna</i>)	<i>Sennagarrettiana</i> (Craib) Irwin & Barneby	Caesalpiniaceae
9	Raweing(<i>Catunaregam</i>)	<i>Catunaregam spathulifolia</i> Tirveng.	Rubiaceae
10	Rungrang (<i>Heterophragma</i>)	<i>Heterophragma sulfureum</i> Kurz	Bignoniaceae
11	Yor Pha (<i>Morinda</i>)	<i>Morinda tomentosa</i> Heyne. ex Roth	Rubiaceae
12	Teaw Khon(<i>Cratoxylum</i>)	<i>Cratoxylum formosum</i> (Jack) Dyer	Clusiaceae
13	Kahat (<i>Artocarpus</i>)	<i>Artocarpus lacucha</i> Roxb.	Moraceae
14	Yang Grad (<i>Dipterocarpus</i>)	<i>Dipterocarpus intricatus</i> Dyer.	Dipterocarpaceae
15	Takhop Pha(<i>Flacourtia</i>)	<i>Flacourtiaindica</i> (Burm.f.) Merr.	Flacourtiaceae
16	Tew (<i>Cratoxylum</i>)	<i>Cratoxylum cochinchinense</i> (Lour.) Bl.	Guttiferae
17	Sadao Pha (<i>Azadirachta</i>)	<i>Azadirachta indica</i> Juss. var. Valetton	Meliaceae
18	Chanuan (<i>Dalbergia</i>)	<i>Dalbergia nigrescens</i> Kurz.	Papilionoideae
19	Maklua Kha (<i>Alangium</i>)	<i>Alangium salviifolium</i> (L.f.) Wangerin subsp. hexapetalum Wangerin.	Alangiaceae
20	Ma Kha Mong (<i>Afzelia</i>)	<i>Afzelia xylocarpa</i> (Kurz) Craib.	Caesalpiniaceae
21	Manow Pha (<i>Zanthoxylum</i>)	<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	Rutaceae
22	Aoi Chang(<i>Albizia</i>)	<i>Albizia myriophylla</i> Benth.	Mimosaceae
23	Ta Nok Kot (<i>Ellipanthus</i>)	<i>Ellipanthus tomentosus</i> Kurzvar.tomentosus	Connaraceae

Table 2 The Biological Diversity of Medicinal Plants

Rank	Common names	D	RD	RF	RDo	IVI
1	Makha Tae(<i>Sindora</i>)	110.00	34.59	16.00	33.58	84.18
2	Teng(<i>Shorea</i>)	92.00	28.93	14.00	24.27	67.20

**Table 2 (Cont.)**

Rank	Common names	D	RD	RF	RDo	IVI
3	MakhamPom(Phyllanthus)	26.00	8.18	4.00	6.24	18.42
4	Gut Lin(Walsura)	10.00	3.14	6.00	3.92	13.06
5	Srithanonchai(Buchania)	10.00	3.14	6.00	3.24	12.39
6	MamuangHauMangwan(Buchania)	6.00	1.89	6.00	4.46	12.35
7	Pradu (Plerocarpus)	6.00	1.89	6.00	2.23	10.12
8	KheeLek Ban (Senna)	4.00	1.26	4.00	2.43	7.69
9	Raweing (Catunaregam)	6.00	1.89	4.00	1.44	7.33
10	Rungrang (Heterophragma)	2.00	0.63	2.00	4.68	7.31
11	YorPha(Morinda)	4.00	1.26	4.00	1.85	7.10
12	TeawKhon (Cratoxylum)	6.00	1.89	4.00	0.97	6.86
13	Kahat (Artocarpus)	4.00	1.26	2.00	3.46	6.72
14	Yang Grad (Dipterocarpus)	6.00	1.89	2.00	2.35	6.23
15	TakhopPha (Flacourtia)	4.00	1.26	4.00	0.77	6.03
16	Tew (Cratoxylum)	6.00	1.89	2.00	1.06	4.94
17	SadaoPha (Azadirachta)	4.00	1.26	2.00	0.99	4.24
18	Chanuan (Dalbergia)	2.00	0.63	2.00	0.59	3.22
19	MakluaKha (Alangium)	2.00	0.63	2.00	0.36	2.99
20	MaKhaMong (Afzelia)	2.00	0.63	2.00	0.32	2.95
21	ManowPha (Zanthoxylum)	2.00	0.63	2.00	0.28	2.91
22	AoiChang (Albizia)	2.00	0.63	2.00	0.25	2.88
23	Ta NokKot (Ellipanthus)	2.00	0.63	2.00	0.25	2.88
H' (Shannon-Weiner index) =0.91		318.00	100	100	100	300
E (Evenness index) =0.29						

2. Use Utilization and Value Addition of Medicinal Plants

2.1 There are 23 medicinal plants used as specimen of the study. Since the ancient time until the present time, using medicinal plant products for taking care of their health has been the culture of people in this community as shown in table 3

Table 3 Health Benefit of Medicinal Plants

List	Common names	Plant parts used	Methods of making use of medicinal plants
1	Sindora	Barks	Barks boiled with drinking water can be used for curing skin disease, aphthous ulcer, and children's loss of appetite- Mucocoele in mouth and throat, and white tongue.
		Seeds	Seeds can be used for driving worms and curing skin diseases.
		Plant knobs on bark or branches	Tree knobs on stems or branches boiled with drinking water can be used for killing of worms in human bodies, and treat skin disease. Also, it is used for healing Hemorrhoids or Piles.
2	Shorea	Barks and stems	Barks and stems can be boiled with drinking water and used for curing skin disease, poor lymph disorder, diarrhea and dysentery. It is also used for stopping bleeding or for healing wound.
		Leaves	Leaves boiled with drinking water can be used for healing skin diseases and blister.
3	Phyllanthus	Bark and stem	Dry barks and stems can be ground into fine pieces and spray on bleeding wounds or bruises or boiled to cure for dysentery.
		Leaves	15-20 grams off resh leaves boiled with drinking water can be used to relieve swollen body; ground fresh leaves can be used to cover wounds with abscess or infectious wound or anal fistula
		Knob at the tree branch	10-30 plant knobs on twigs boiled with drinking water can be used to relieve pain in the bones, abdominal pains or stomachache , losing appetite for children, or coughing, or boiled with can be used for mouth wash, and toothache.
		Fresh or dry fruit	Dry or fresh fruit has sour and bitter taste. It can be used for healthy blood, increasing saliva gland, making mucolytic less thick, dry throat and diuresis.



Table 3 (Cont.)

List	Common names	Plant parts used	Methods of making use of medicinal plants
4	Walsura	Ripe fruit	Fresh or ripe fruit can be used for curing decaying wound, stomach ache, and stomach ulcer.
		Roots and Stems	Roots and stems can be boiled with drinking water to relieve body aching, ligament pain, reviving tendon and relieve flatulence.
5	Buchanania	Roots	Root ground and mixed with drinking water can be used to cure fever and gallbladder diseases and relieve gas in the stomach.
		Barks and stems	Bark and stem boiled mixed with saline solution can be used as liquid medicine for gurgling for 30 minutes to cure periodontal disease.
		Stems and roots	Stem and root can be boiled with water to heal for food poisoning.
		Leaves	Leaves can be pounded or ground for rash.
6	Buchanania	Liquid gum and roots	Liquid gum and roots can be ground for curing diarrhea and dysentery.
		Seeds	Oil from the seed can be extracted and used for producing chemical products for skin disease treatment.
		Leaves and Flowers	Leaves and flowers boiled with drinking water can be used for curing fever, skin diseases, bites from snakes and scorpions, also to prevent bacteria.
		Barks and Stems	Barks and stems boiled with drinking water are used for inflammation from toxic plants.
7	Plerocarpus	Leaves and flowers	Leaves and flowers can be used for curing skin rash, or for covering wounds and ripening abscess.
		Barks	Barks can be used for curing mouth ulcer, or diarrhea.
		Roots	Roots can be boiled with water for curing fever.
8	Senna	Barks, Stems, and Young leaves of plants	Barks, Stems and heartwood boiled with drinking water can be used for curing hemorrhoids, laxative, coughing medicine, mucus relief, and haemagogue.
		Flowers	Young leaves of plant top can be boiled for curing diabetes.
		Leaves	Flowers can be boiled with drinking water for in somnia treatment.
		Leaves	Leaves can be boiled with water for stomach worm driving, cancer in blood veins.
		Heartwood	Leaves can be boiled with water for stomach worm driving, cancer in blood veins.
9	Catunaregam	Fruit	Heartwood can be boiled with drinking water to kill tape worm, or mix with Champa heartwood and Cassia Alata for curing hemorrhoids
		Fruit	Fruit mixed with water can be used for setting hair style and clean clothes such as shampoo, hair cream, skin lotion, and soap.
10	Heterophragma	Heartwood	Heartwood can be boiled with drinking water for diabetic treatment.
11	Morinda	Roots	Roots can be used for diabetic treatment.
		Heartwood	Heartwood can be boiled with drinking water as hematinic for blood cleaning.
		Leaves	Roast Leaves can be used to cover on chess for soothing coughing, relieving gas pain in stomach, or covering head for flea killing.
		Fruit and ripe fruit	Fruit can be used to prevent vomiting; ripe fruit can be used to relieving gas in stomach, and haemagogue.
12	Morinda	Liquid gum	Fruit mixed with water can be used for setting hair style and clean clothes such as shampoo, hair cream, skin lotion, and soap.
		Barks, Stems, and Leaves	Liquid gum can be used for healing wounds, stop itching, and healing mouth ulcer.
		Leaves	Barks, stems, and leaves can be ground with coconut oil for curing, and skin disease.
		Roots	Roots mixed with other medicinal mixtures such as sedge and roots of <i>Eurycomalongifolia</i> Jack. can be used for curing dysuria.
13	Artocarpus	Roots	Roots mixed with other medicinal mixtures such as sedge and roots of <i>Eurycomalongifolia</i> Jack. can be used for curing dysuria. Ground roots mixed with coconut oil can be used as insecticide, or it is mixed with rinsing water from cleaning rice can be used to cure rotten wound in cattle, or mixed with coconut oil for killing fleas, and scabies. Root and leaves can be boiled with water for healing stomachache.
		Roots	Roots mixed with other medicinal mixtures such as sedge and roots of <i>Eurycomalongifolia</i> Jack. can be used for curing dysuria. Ground roots mixed with coconut oil can be used as insecticide, or it is mixed with rinsing water from cleaning rice can be used to cure rotten wound in cattle, or mixed with coconut oil for killing fleas, and scabies. Root and leaves can be boiled with water for healing stomachache.
13	Artocarpus	Heartwood and wood bark	Heartwood and wood can be boiled with drinking water for killing stomach worms and used as laxation. Bark and stem have bitter taste and can be chewed with beetle nut instead of <i>Acacia catechu</i> .
		Barks	Bark boiled with drinking water can be scrubbed to relieve aching in joints, swollen organ and bruises.
14	Dipterocarpus	Stems	Bark boiled with drinking water can be scrubbed to relieve aching in joints, swollen organ and bruises.
		Wood	Stems can be boiled with water for drinking to relieve fever causing high temperature, restless, and inactiveness.
		Wood	Wood burnt as charcoal, then boil with drinking water can be used for curing fever and skin disease.



Table 3 (Cont.)

List	Common names	Plant parts used	Methods of making use of medicinal plants
15	Flacourtia	Heartwood	Heart wood can be boiled with drinking water to cure food poisoning, diarrhea, dysentery, sweating and getting rid of Ascarislumbricoides, rickets with enlargement of the abdomen, skin disease, agitate, and itching; it can be mixed with wood apple or masung heartwood and boiled with drinking water for muscle aching and skin itching or can be mixed and boiled with <i>Feroniella lucida</i> and <i>Bridelia retusa</i> for muscle aching and itching.
		Roots	Roots with the taste of bitter and spicy can be used for malnutrition treatment, getting rid of ascariasis, actiating milk production, pneumonia; a handful of roots boiled with drinking water can be used for renal failure 3-4 times a day. Stems and root can be used to treat skin diseases, agitate and rash on the body.
		Stems	Stems mixed wild <i>Cheilocostus speciosus</i> bulb and hydrocotyle 3-4 fresh water shells for children to take a bath to cure chicken pox.
		Liquid gum	Liquid gum can be used to treat diarrhea, cholera, pneumonia, coughing, and dysentery.
		Barks	Barks soaked in water can be used for dry throat or gurgle for sore throat. If ground bark with coconut oil can be used for scrubbing to cure stomachache and skin itching.
		Dry leaves	Dry leaves can be eaten to heal wounds, relieve mucolytic, asthma, bronchitis, fever, coughing medicine, dysentery, and relieving flatulence and increase good health. Dry leaves can brewed like teareviving women after baby delivery.
		Seeds	Seeds can be pound like paste to heal joint pains.
		Fruit	Fruit contains high vitamin C and can be used for scurvy, feeling tired, jaundice, spleen disease dizziness, preventing vomiting, and laxative potion.
		16	Cratoxylum
Young leaves and young plant shoot	Young leaves and Young shoot can be eaten as smooth laxative.		
17	Azadiracht	Barks and roots	Barks and roots boiled with drinking water can be used for fever and treating skin disease
18	Dalbergia	Barks	Barks boiled with Buchanania and drinking water can be used for body aching, ligament pain and muscular pain.
19	Alangium	Barks and Fresh leaves	Bark and fresh leaves boiled with drinking water can be used for relieving inflammation, lower blood pressure, increasing heartbeat, subtracting smooth muscle, reduce size of blood vein, purifying blood, anti-bacterium, anti-fungi, anti- protozoa, anti-cancer, anti-yeast.
20	Afzelia	Knobs on tree trunk	Stems with knobs can be used for worming, and skin disease.
		Barks	Barks and stems mixed Taew or Pang Kee with the portion of 50:50 can be used to heal wounds, driving of parasitic worms.
		Seeds	Seeds used for getting rid of parasitic worms.
21	Zanthoxyl	Leaves	Leaves crushed and filled tooth cavity for pyorrhoea or relieving toothache and skin disease.
		Roots	Roots and wood boiled with drinking water can be used to relieve Gastric ulcer, dizziness, fainting, and haemagogue.
		Seeds	Seeds can be used for curing fainting and drowsiness, purifying blood, relieving gastric ulcer, diuretic, Nourish the body elements, purifying good blood, relieving gastric ulcer, detoxifying ; seeds can be extracted for aroma oil.
22	Albizia	Barks	Bark boiled with drinking water can be used for toothache, or ground bark can be used for treating skin diseases.
		Roots	Root with a sweet taste can be boiled with drinking water for healing stomachache, dysentery and laxative.
		Fruit	Fruit can be boiled with drinking water for coughing medicine and mucolytic.
23	Zanthoxylum	Twigs, branches, and Stems	Twig or branches and stem boiled with drinking water can be used as medicine for stomach cramp, relieving gastric ulcer, inducing appetite.
		Heartwood	Heartwood boiled with drinking water can be used for body aching and bruises on body.
		Barks	Barks boiled with drinking water can be used for curing urinary inflammation.

2.2 Local healers’ wisdom is used for producing medicinal recipes for health care. This is a valuable source of knowledge and can increase the value of locally produced medicinal and health care products.



Twenty medicinal recipes are shown in Table 4. In conclusion, the local healers use medicinal plants or trees in Polsongkram Sub-district as ingredients or mixtures in drug recipes. The plants or trees used in this way include Takhop Pha (*Flacourtia*), Makham Pom (*Phyllanthus*), Manow Pha (*Zanthoxylum*), Khee Lek Ban (*Senna*), Gut Lin (*Walsura*), Yor Pha (*Morinda*), Makha Tae (*Sindora*) and Tew (*Cratoxylum*), shown in figure 1(a – h).

Table 4 Medicinal Recipe for Health Care

List	Therapeutic Values	Medicinal plants used for treatments
1	Hemorrhoids	<i>Sindora</i> , <i>Shorea</i> , <i>Walsura</i> , <i>Senna</i> , <i>Zanthoxylum</i>
2	Skin disease and Healing wounds	<i>Sindora</i> , <i>Shorea</i> , <i>Walsura</i> , <i>Buchanania</i> , <i>Pericarp</i> , <i>Cratoxylum</i> , <i>Dipterocarpus</i> , <i>Flacourtia</i> , <i>Cratoxylum</i> , <i>Azadirachta</i> , <i>Alangium</i> , <i>Afzelia</i> , <i>Zanthoxylum</i> , <i>Albizia</i>
3	Toothache and Pyorrhea	<i>Phyllanthus</i> , <i>Buchanania</i> , <i>Flacourtia</i> , <i>Albizia</i>
4	Body aching and Bruises	<i>Phyllanthus</i> , <i>Walsura</i> , <i>Dipterocarpus</i> , <i>Flacourtia</i> , <i>Cratoxylum</i> , <i>Alangium</i> , <i>Afzelia</i> , <i>Ellipanthus</i>
5	Coughing	<i>Senna</i> , <i>Morinda</i> , <i>Phyllanthus</i> , <i>Flacourtia</i> , <i>Ellipanthus</i> , <i>Albizia</i>
6	Fever	<i>Sindora</i> , <i>Artocarpus</i> , <i>Phyllanthus</i> , <i>Flacourtia</i> , <i>Dipterocarpus</i> , <i>Azadirachta</i>
7	Laxative and Wormdriving	<i>Phyllanthus</i> , <i>Plerocarpus</i> , <i>Senna</i> , <i>Artocarpus</i> , <i>Flacourtia</i> , <i>Cratoxylum</i> , <i>Afzelia</i>
8	Urinary tract infection	<i>Zanthoxylum</i> , <i>Cratoxylum</i> , <i>Ellipanthus</i>
9	Diarrhea and Dysentery	<i>Shorea</i> , <i>Buchanania</i> , <i>Phyllanthus</i> , <i>Plerocarpus</i> , <i>Flacourtia</i> , <i>Albizia</i>
10	Carminative	<i>Zanthoxylum</i> , <i>Flacourtia</i>
11	Emmenagogue	<i>Senna</i> , <i>Morinda</i> , <i>Zanthoxylum</i>
12	Diabetes	<i>Senna</i> , <i>Morinda</i> , <i>Catunaregam</i> , <i>Heterophragma</i>
13	Mouth ulcer and Hot fix	<i>Plerocarpus</i> , <i>Walsura</i> , <i>Cratoxylum</i>
14	Food poisoning	<i>Buchanania</i> , <i>Flacourtia</i>
15	Flea killing	<i>Morinda</i> , <i>Cratoxylum</i> , <i>Cratoxylum</i>
16	Lotion or moose for hair styling	<i>Catunaregam</i>
17	Dizziness and fainting	<i>Zanthoxylum</i> , <i>Flacourtia</i>
18	Blood treatment	<i>Morinda</i> , <i>Zanthoxylum</i> , <i>Alangium</i>
19	Appetizer	<i>Sindora</i> , <i>Phyllanthus</i>
20	Stomach ache	<i>Walsura</i> , <i>Senna</i> , <i>Cratoxylum</i>



Figure 1 Medicinal plants in Pongsongkram Sub-district.

Discussion

The survey of Pongsongkran Community Forest identified 23 plant types, 21 plant species and 18 plant families, with Caesalpiniaceae being the main species, which included Makkhatae (*Sindora siamensis* Teijsm. ex Miq.) Khee Lek Baan (*Senna garrettiana* (Craib) Irwin & Barneby) and Makha Mong (*Azelia xylocarpa* (Kurz) Craib).

The second most common plants were of the species of Dipterocarpaceae, including Teng (*Shoreaobtusa* Wall. ex Blume) and Yang Gard (*Shoreaobtusa* Wall. ex Blume). These trees are the outstanding species of this deciduous dipterocarp forest, which is a sparse forest (Smitinard, 1977).

The highest frequency tree found in the forest is *Sindora* with the index value of 16.00. The next most found trees are *Shorea*, *Walsura*, *Srithanonchaio* *Buchanania*, *Mamuang Hau Mangwan* or *Buchanania* and *Plerocarpus*. The highest frequency of relative index is *Sindora* with the value of 33.58, and the next ones are *Shorea* and *Phyllanthus*. The result of our study was found to be similar to that of the comparative study of Nakawong, Chatan & Promprom (2015). Because these trees are the outstanding species in Dipterocarp Forest, they are, therefore, found everywhere in the forest (Smitinard, 1977). The diversity value of the plants in this forest is 0.9 and it has the evenness index of 0.29. But the plant that has the most important index is Makha Tae or *Sindora* (*Sindora siamensis* Teijsm. ex Miq.). It has the evenness index of 84.18. These trees are widely grown there. They are the types of medicinal trees that are the tallest in the forest and also the most influential ones.

The second type of trees that are found is Teng or *Shorea* (*Shoreaobtusa* Wall. ex Blume) with the value of 67.20 and Makham Pom (*Phyllanthusemblica* Linn.) These trees are less tall than Makha Tae (*Sindora siamensis* Teijsm. ex Miq.) and Makham Pom has the index value of 18.42. They usually grew among the tallest trees (Teng) in the forest. They are also important to the forest. *Shorea* is the most trees grown in the forest with the average of 110 trees per rai (2 rais equals 1 acre). *Phyllanthus* is the second type of trees that



are mostly found there. Its index value is 18.42, respectively. The numbers of Makhm Pom or *Phyllanthus* 26 trees per rai, Gut Lin or *Walsura* and *Srithanonchai* or *Buchanania* 10 trees per rai, Mamuang Hau Mangwan or *Buchanania*, Pradu or *Plerocarpus*, Rawiang or *Catunaregam* and Tew or *Cratoxylum* (6 trees per rai), Rung Rang or *Heterophragma*, Chanuan or *Dalbergia*, Maklue Kha or *Alangium*, Makha Mong or *Azelia*, Mannow Pha or *Zanthoxylum*, Aoi Chang or *Albizia*, Ta Nok Kot or *Ellipanthus* (2 per rai). These index values derives from the comparative study of plant diversity.

The result of our study was similar to that of the study of plant community at the public cemetery of Ban gan, Tung Kula Municipal Sub-district, Suwannaphum District, Roi-Et, That is, there are 24 types of trees with the diversity index of 2.75 and the index of evenness of 0.86 and the diversity value is 15.67 Ban Jarn Community cemetery Forest. It was found that *Dipterocarpus intricatus* Dyer is the most valuable trees and *Cratoxylum formosum* (Jack.) Benth. & Hook. f. ex. Dyer is the young wood trees that is the most important because they can grow to be big trees in the future because they can grow very fast and easy to reproduce. The local people do not make use of the wood of *Cratoxylum formosum* (Jack.) Benth. & Hook.f. ex Dyer, but they make use of its flowers and its young leaves. For *Dipterocarpus intricatus* Dyer, local people make use of these trees for building homes. Thus, it could be speculated that in the future *Cratoxylum formosum* (Jack.) Benth. & Hook.f. ex Dyer may be the most outstanding trees in the forest. Local people with their local wisdom make use of 61 trees for their living. However, there are approximately 38 types of trees that are used for medicinal purposes. (Nakawong, Chatan&Promprom, 2015).

Thus, it could be inferred that there is a tendency that *Shorea*, *Phyllanthus*, and *Buchanania* are going to be the tallest wood in the forest. Consequently, the community has set up plans for conserving community forest with various activities such as ordaining the tree during their local celebrations. Thus it could be concluded that *Shorea*, *Phyllanthus*, and *Buchanania* are going to be the most outstanding trees in the forest in the future.

As far as the study of the value-added medicinal plants is concerned, local people of Polsongkram Sub-district, Nonesong District, Nakhon Ratchasima has been making use of trees from their community forest for a long time, particularly for health care by applying local healers' wisdom.

It was found from the study that people in the village make use of 23 types of trees. They manage to make use of the knowledge for health care according to their Thai local wisdom. They have added value to the local medical products and use them for medicinal products. There are 20 recipes for making traditional local medicinal products, as shown in Table 4.

As compared to the research results of Nakawong, Chatan and Promprom (2015); Boonchai (2004) and Rattanapotanan (2013), it was found that these results were similar to each other. Nakawong, Chatan & Promprom's results showed that the local people at Ban Jarn make use of 61 plants from the forest for their living, and 38 out of the 61 plants are used as medicinal drugs. 7 parts of the plants or trees being used for medicinal products are roots, bulbs, trunk (including stem, heartwood, bark, and vines) leaves, fruits, seeds and liquid gum. Boonchai's study results of Phutai's use of herbal plant for health care products showed that Phutai local drug healers make use of these parts of plants or trees for 33 types of sickness. Most of the drugs are used for women after their baby delivery for increasing amount of blood, energy booth, fever and sickness concerning intestines.

Our result study is also similar to that of Rattanapotanan's study of the use of natural resource for managing local healers' use of local wisdom for self-reliance in health care at Polsongkram Sub-district,



Nongsung District, Nakhon Ratchasima. Polsongkram local healers make use of 5 types of medicinal plants or trees, that is, bark of *Plerocarpus indicus*, bark of *Morinda tomentosa* Heyne. ex Roth, leaves of *Buchanania lanzan* Spreng, leaves of *Zanthoxylum rhetsa* (Roxb.) DC. and fruit of *Catunaregam spathulifolia* Tirveng with chemical substance of flavanoids, alkaloid, and tannin, which has the quality of killing bacteria, relieving itching rash, skin disease and reviving skin moisture. These essences of medicinal quality can be used for making medicinal products for treating skin problems and for skin care generally. For example, herbal soap is sold at the local community fair. These products have local identity from the community culture and producing them as OTOP products can create new careers for the local people, adding to their economic well-being.

Conclusion and Suggestion

Polsongkram Community Forest, a dry deciduous forest, had plant diversity consisting of 23 medicinal plants from 18 species and 21 families, with species of *Caesalpiniaceae*, which are widely grown in the forest. The plant that has the most important index is *Sindora siamensis* Teijsm. ex Miq., which are very important and influential plants in the ecological system in Polsongkram Community Forest. These plants have long been utilized for local, traditional, medicinal products which increase their value and provide income for the local people. Polsongkram local people have applied the knowledge of our study to create 20 value-added medicinal products. Finally, we are confident that our findings from this study can help raise the local people's awareness of the conservation of the medicinal plants in their community forest for sustainable use. In addition, the academic knowledge should be provided and encouraged in herbal uses among people who had illness appropriately, to promote the herbal uses in primary health care in rural areas.

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