
Diversity and evenness of indigenous vegetables in Nakhon Si Thammarat province, Thailand

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Abstract Diversity and evenness of indigenous vegetables in Nakhon Si Thammarat Province, Thailand were investigated. The field study of indigenous vegetables was conducted from January, 2018 to August, 2018. The Line Transect method in the scope of area 50 x 5000 meters for each district was surveyed. The result showed that the total kind of indigenous vegetables in 10 stations were found into 4 groups. The most abundance was the group of ground cover (62.834 %), the second group was shrub (15.843 %), the third group was climbing (12.304 %) the fourth was trees (4.516 % and the last group was aquatic plants (4.501 %). The result showed that the taxonomy of indigenous vegetables was found 139 species and 50 families. The result showed that the most fami of indigenous vegetables, and ground cover were Apiaceae, Asteraceae and Zingiberaceae (16.55, 6.302 and 6.062 %), respectively. The group of shrub are Musaceae, Leguminosae and Poaceae (3.075, 1.180 and 1.095 %), respectively. The group of climbing are Cucurbitaceae, Piperaceae and Rubiaceae (5.002, 1.086 and 1.032 %), respectively. The group of trees was Leguminosae, Areaceae and Meliaceae (1.144, 0.481 and 0.288 %), respectively. The group of tree are Leguminosae, Areaceae and Meliaceae (1.144, 0.481 and 0.288 %), respectively. The group of aquatic plants was Convolvulaceae, Araceae and Fabaceae (1.581, 1.393 and 0.732 %), respectively.

Keyword: diversity, evenness, indigenous vegetables, shrub, ground cover, climbing

Introduction

Thailand is the country located at the tropical climate area, a great biodiversity and long history of culture. Ancient Thai people might select edible plants from nature to fulfill their life. The indigenous vegetables are currently used as vegetables, spices, herbs, condiments, and sometimes as medicine (Japan International Research Center for Agricultural Science, 2018). For example, the indigenous leafy vegetables enterprise holds the greatest potentials for the provision of additional sources of food, nutritional value, and income particularly for the rural resource-constraint women farmers in Nigeria. In many parts of Africa, indigenous vegetables are

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considered to be "women's crops" because they are mostly grown or gathered by women for both domestic consumption and for sale in markets (Price and Ogle, 2008). Local vegetables are used not only to provide nutrition and flavor food, but also to maintain health and promote wellness. For example, the chemopreventive effect of herbal diets on cancer, cardiovascular diseases. Nowadays, only a limited information on local edible plants Thailand have been published based on diversity and evenness. One of the difficulties for those who study edible Thai plants is the confusion in plant identification and classification. A plant name in a regional dialect corresponds to a different plant in other dialects. And, the same plant has different local names by region. Sometimes local people are confused and put the same name to plural plant species (Japan International Research Center for Agricultural Science, 2018). Therefore, it is necessary to study, record, sort out and classify local edible plants in some location of Thailand base on diversity and certain taxonomic systems as soon as possible.

The objectives of the study to evaluate of the taxonomy, diversity and evenness of indigenous vegetables in Nakhon Si Thammarat province, Thailand

Materials and methods

A study area of the diversity and evenness of indigenous vegetables in Nakhon Si Thammarat's province divided into 10 stations : 1= Thong Song District, 2 = Si Chon District, 3=Pra Prom District, 4= Pi Poon District, 5= Chain Yai District, 6= Chang Klang District,7= Hua Sai District , 8= Lanska District 9= Tumbon Nam tok ,Thong Song District, 10= Bang Khan District. At each station were used the area for field study.

A field study of the diversity and evenness of indigenous vegetables was used Line Transect method in the scope of 50x5000 meters per station.

Data were analyzed the diversity and evenness of indigenous vegetables using the formula $H = -\sum^s (p_i) (\log_2 p_i)$ and $E = H / H_{\max}$ for evaluating the diversity and evenness of indigenous vegetables.

Results

The result showed that the kinds of indigenous vegetables from 10 stations covered 4,236,978 trees. The most abundance was the group of ground cover (62.834 %) as seen in Table 1. The second is the group of shrub (15.843 %) as seen in Table 2. The third is the group of climbing (12.304 %) as seen in Table 3. The least kind of indigenous vegetables were trees and aquatic plants (4.516 and 4.501%) as stated in Table 4-5, respectively. The kinds of indigenous vegetables were found 139 species and 50 families, the kind of ground cover was founded 33 species and 11

families, the kind of shrub was founded 35 species and 20 families, the kind of climbing was founded 19 species and 10 families, the kind of tree was found 46 species and 20 families and the kind of aquatic plant was found 6 species and 5 families.

Table 1. Kind of the indigenous vegetables (ground cover group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family	Ground cover	N	%
<i>Oenanthe javanica</i> (Blume) DC.	Apiaceae	/	359,790	8.492
<i>Centella asiatica</i> L. Urban	Apiaceae	/	341,425	8.058
<i>Emilia sonchifolia</i> L.	Asteraceae	/	267,000	6.302
<i>Curcuma longa</i> L.	Zingiberaceae	/	256,856	6.062
<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	/	236,000	5.570
<i>Cymbopogon citratus</i> Stepf	Poaceae	/	170,000	4.012
<i>Stenochlaena palustris</i> (Burm.f.) Bedd.	Pteridaceae	E	142,000	3.351
<i>Solanum melongena</i> L.	Solanaceae	/	128,055	3.022
<i>Zingiber montanum</i> (J.Koenig) Link ex A.Dietr.	Zingiberaceae	/	96,018	2.266
<i>Kaempferia rotunda</i> L.	Zingiberaceae	/	95,000	2.242
<i>Piper sarmentosum</i> Roxb.	Piperaceae	/	84,226	1.988
<i>Capsicum frutescens</i> Linn.	Solanaceae	/	66,000	1.558
<i>Cleome viscosa</i> L.	Cleomaceae	/	52,000	1.227
<i>Ocimum tenuiflorum</i>	Lamiaceae	/	51,882	1.225
<i>Zingiber zerumbet</i> L.	Zingiberaceae	/	48,500	1.145
<i>Ocimum sanctum</i>	Lamiaceae	/	38,913	0.918
<i>Bidens bipinnata</i> L.	Asteraceae	/	38,863	0.917
<i>Ocimum gratissimum</i> L.	Lamiaceae	/	30,245	0.714
<i>Eryngium foetidum</i> Linn.	Apiaceae	/	27,800	0.656
<i>Tagetes erecta</i> L.	Asteraceae	/	24,124	0.569
<i>Colocasia gigante</i> Hook. F.	Araceae	/	18,000	0.425
<i>Ocimum basilicum</i> L.	Lamiaceae	/	14,016	0.331
<i>Colocasia esculenta</i> (L.) Schott	Araceae	/	12,372	0.292
<i>Amorphophallus konjac</i> K.Koch	Araceae	/	11,407	0.269
<i>Etingera coccinea</i> (Blume)	Zingiberaceae	/	11,000	0.260
<i>Boesenbergia rotunda</i> L.	Zingiberaceae	/	10,061	0.237
<i>Leea indica</i> (Burm.f.) Merr.	Vitaceae	/	10,000	0.236
<i>Curcuma zedoaria</i> Berg. Roscoe	Zingiberaceae	/	6,745	0.159
<i>Ocimum gratissimum</i> L.	Lamiaceae	/	4,300	0.101
<i>Kaempferia parviflora</i> Wallich.	Zingiberaceae	/	3,117	0.074
<i>Typhonium trilobatum</i> L.	Araceae	/	2,557	0.060
<i>Homalomena rostrata</i> Griff.	Araceae	/	2,000	0.047
<i>Peacock ginger</i> Resurrection lily	Zingiberaceae	/	2,000	0.047
total of ground cover			2662,272	62.834
Total of indigenous vegetable			4,236,978	100

Table 2. Kind of the indigenous vegetables (shrub group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family	Shrub	N	%
<i>Musa acuminata</i> Colla.	Musaceae	/	157,000	3.705
<i>Acacia pennata</i> (L.) Will.	Leguminosae	/	50,000	1.180
<i>Bambusa bambos</i> (L.) Voss	Poaceae	/	46,400	1.095
<i>Dendrocalamus strictus</i> (Roxb.) Nees	Poaceae	/	41,720	0.985
<i>Sauropus androgynus</i> (L.) Merr.	Phyllanthaceae	/	33,124	0.782
<i>Bambusa sp.</i>	Poaceae	/	30,000	0.708
<i>Musa sapientum</i> Linn.	Musaceae	/	28,020	0.661
<i>Polyscias fruticosa</i> (L.) Harms	Araliaceae	/	26,136	0.617
<i>Gnetum gnemon</i> var.	Gnetaceae	/	25,167	0.594
<i>Alpinia galanga</i> (L.) Willd	Zingiberaceae	/	25,000	0.590
<i>Manihot esculenta</i> Crantz	Euphorbiaceae	/	19,000	0.448
<i>Solanum torvum</i> Swartz	Solanaceae	/	18,300	0.432
<i>Salacca wallichiana</i> C.Mart.	Arecaceae	/	18,000	0.425
<i>Melientha suavis</i> Pierre	Opiliaceae	/	17,606	0.416
<i>Ananas comosus</i> L.	Bromeliaceae	/	17,140	0.405
<i>Citrus aurantifolia</i> Swing	Rutaceae	/	15,340	0.362
<i>Zingiber officinale</i> Roscoe	Zingiberaceae	/	15,270	0.360
<i>Carica papaya</i> L.	Caricaceae	/	14,231	0.336
<i>Hibiscus sabdariffa</i> L.	Malvaceae	/	12,639	0.298
<i>Etilingera elatior</i> (Jack) R.M. Smith	Zingiberales	/	11,186	0.264
<i>Solanum indicum</i> L.	Solanaceae	/	10,200	0.241
<i>Solanum stramoniiifolium</i> Jacq.	Solanaceae	/	8,529	0.201
<i>Senna tora</i> (L.) Roxb.	Fabaceae	/	7,400	0.175
<i>Ficus hispida</i> L.f.	Moraceae	/	5,000	0.118
<i>Senna alata</i> (L.) Roxb.	Fabaceae	/	4,603	0.109
<i>Senna siamea</i>	Fabaceae	/	4,000	0.094
<i>Olox psittacorum</i> (Lam.)	Olacaceae	/	2,000	0.047
<i>Zingiber montanum</i> (J.Koenig) Link ex A.Dietr.	Zingiberaceae	/	2,000	0.047
<i>Ardisia lenticellata</i> Fletch.	Myrsinaceae	/	2,000	0.047
<i>Acacia concinna</i> (Willd.) DC.	Fabaceae	/	1,615	0.038
<i>Cassia siamea</i> Britt.	Leguminosae	/	1,000	0.024
<i>Claoxylon longifolium</i> (blume)	Euphorbiaceae	/	1,000	0.024
<i>Citrus medica</i> L.	Rutaceae	/	356	0.008
<i>Polyscias paniculata</i> Baker	Araliaceae	/	300	0.007
<i>Plumbago zeylanica</i> (L.)	Plumbaginaceae	/	50	0.001
Total of shrub			671,282	15.843
			4,236,97	
Total of indigenous vegetables			8	100

The result showed that the most abundance of family in each group of indigenous vegetables, the group of ground cover are Apiaceae, Asteraceae and Zingiberaceae (16.55, 6.302 and 6.062 respectively). The group of shrub are Musaceae, Leguminosae and Poaceae (3.075, 1.180 and 1.095 %), respectively. The group of climbing are Cucurbitaceae, Piperaceae and Rubiaceae (5.002, 1.086 and 1.032 %) respectively. The group of tree are Leguminosae, Arecaceae and Meliaceae (1.144, 0.481 and 0.288 %) respectively. The group of tree are Leguminosae, Arecaceae and Meliaceae (1.144, 0.481 and 0.288 %) Table 4, respectively. The group of aquatic plant are Convolvulaceae, Araceae and Fabaceae (1.581, 1.393 and 0.732 %) Table 4, respectively.

Table 3. Kind of the indigenous vegetables (climbing group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family		N	%
Kind of indigenous vegetables		Climbing		
<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	/	136000	3.210
<i>Momordica subangulata</i> Blume	Cucurbitaceae	/	75922	1.792
<i>Piper nigrum</i> L.	Piperaceae	/	46000	1.086
<i>Paederia foetida</i> L.	Rubiaceae	/	43742	1.032
<i>Momordica charantia</i> L.	Cucurbitaceae	/	38000	0.897
<i>Limacia triandra</i> Miers	Menispermaceae	/	35400	0.836
<i>Psophocarpus tetragonolobus</i> (L.) DC.	Fabaceae	/	31700	0.748
<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	/	23125	0.546
<i>Passiflora foetida</i> L.	Passifloraceae	/	23000	0.543
<i>Clitoria ternatea</i> L.	Fabaceae	/	19945	0.471
<i>Cucurbita moschata</i>	Cucurbitaceae	/	9122	0.215
<i>Ipomoea batatas</i> (L.) Lam	Convolvulaceae	/	8873	0.209
<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae	/	8533	0.201
<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	/	7000	0.165
<i>Pachyrhizus erosus</i> L.	Fabaceae	/	6500	0.153
<i>Lagenaria siceraria</i> (Molina) Standl.	Cucurbitaceae	/	4020	0.095
<i>Piper retrofractum</i> Vahl.	Piperaceae	/	2382	0.056
<i>Asparagus racemosus</i> Willd	Asparagaceae	/	1956	0.046
<i>Solanum trilobatum</i> L.	Solanaceae	/	100	0.002
Total of climbing			521,320	12.304
			4,236,97	
Total of indigenous vegetables			8	100

Table 4. Kind of the indigenous vegetables (tree group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family	Tree	N	%
<i>Leucaena leucocephala</i> (Lam.)	Leguminosae	/	58,377	1.377
<i>Cocos nucifera</i> L.	Arecaceae	/	20,418	0.481
<i>Azadirachta excelsa</i> (Jack) Jacobs	Meliaceae	/	12,228	0.288
<i>Parkia speciosa</i> Hassk.	Leguminosae	/	10,945	0.258
<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	/	9,554	0.225
<i>Ficus hispida</i> L.f.	Moraceae	/	8,790	0.207
<i>Glochidion wallichianum</i> Muell. Arg.	Euphorbiaceae	/	8,322	0.196
<i>Anacardium occidentale</i> L.	Anacardiaceae	/	8,237	0.194
<i>Barringtonia acutangula</i> (L.) Gaertn.	Lecythidaceae	/	7,658	0.180
<i>Ficus botryocarpa</i> Miq.	Moraceae	/	5,094	0.120
<i>Citrus hystrix</i> DC.	Rutaceae	/	4,988	0.117
<i>Senna siamea</i>	Fabaceae	/	4,322	0.102
<i>Mangifera indica</i> L.	Anacardiaceae	/	4,316	0.101
<i>Averrhoa bilimbi</i> L.	Oxalidaceae	/	3,128	0.073
<i>Garcinia cowa</i> Roxb. ex Choisy	Clusiaceae	/	2,724	0.064
<i>Artocarpus heterophyllus</i>	Moraceae	/	2,689	0.0634
<i>Bouea microphylla</i> Merr.	Anacardiaceae	/	2,385	0.056
<i>Phyllanthus acidus</i> Linn.	Euphorbiaceae	/	1,980	0.0467
<i>Tamarindus indica</i> Linn	Fabaceae	/	1,887	0.044
<i>Morinda citrifolia</i> L.	Rubiaceae	/	1,879	0.0443
<i>Artocarpus integer</i> (Thunb.)	Moraceae	/	1,806	0.042
<i>Moringa oleifera</i> Lam	Moringaceae	/	1,772	0.0418
<i>Mangifera foetida</i> Lour	Anacardiaceae	/	1,214	0.0286
<i>Archidendron jiringa</i> (Jack) I.C. Nielsen	Fabaceae	/	1,157	0.027
<i>Borassus flabellifer</i> L.	Arecaceae	/	1,024	0.0241
<i>Sesbania grandiflora</i> L.	Fabaceae	/	666	0.0157
<i>Sandoricum koetjape</i> (Burm.f.) Merr.	Meliaceae	/	575	0.0135
<i>Schinus terebinthifolius</i> Raddi	Anacardiaceae	/	514	0.0121
				0.0094
<i>Citrus lucida</i> (Scheff)	Rutaceae	/	400	4
<i>Spondias pinnata</i> L.	Anacardiaceae	/	355	0.0083
				0.0080
<i>Duabanga grandiflora</i> (DC.) Walp.	Lythraceae	/	343	9

Table 4. (Cont.) Kind of the indigenous vegetables (tree group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family	Tree	N	%
<i>Elateriospermum tapos</i> Blume	Euphorbiaceae	/	341	0.00804
<i>Parkia timoriana</i> (DC.) Merr.	Fabaceae	/	234	0.00552
<i>Clausena harmandiana</i>	Rutaceae	/	200	0.00472
<i>Garcinia atroviridis</i>	Guttiferae	/	200	0.004720
<i>Dillenia obovata</i> (Blume) Hoogland	Dilleniaceae	/	176	0.00415
<i>Litsea petiolata</i> Hook.f.	Lauraceae	/	165	0.00389
<i>Cratoxylum formosum</i> (Jacq.) <i>Garcinia atroviridis</i> Griff. ex T.Anderson	Hypericaceae Guttiferae	/ /	100 51	0.00236 0.00120
<i>Baccaurea parviflora</i>	Phyllanthaceae	/	37	0.000873
<i>Averrhoa carambola</i> L.	Oxalidaceae	/	35	0.000826
<i>Azadirachta indica</i> A.Juss	Meliaceae	/	30	0.000708
<i>Bauhinia malabarica</i> roxb	Leguminosae	/	15	0.000354
<i>Phyllanthus emblica</i> L.	Euphorbiaceae	/	12	0.000283
<i>Ficus racemosa</i> L.	Moraceae	/	8	0.000188
<i>Garcinia schomburgkiana</i> Pierre	Clusiaceae	/	3	0.0000708
Total of tree			191,354	4.516
			4,236,97	
Total of indigenous vegetable			8	100

The result of the diversity indices of indigenous vegetables on 10 stations of Nakhon Si Thammarat province, Thailand were found the diversity indices of indigenous vegetables on stations of 7,4,10,2,5,9,8,3,1 and 6 which were 5.515, 5.403,5.373,5.360,5.286,5.239,5.199,5.119,4.938 and 3.986, respectively. The most of the diversity indices were shown on station 7 (Hua Sai District) as 5.516. The least diversity indices were shown on station 6 (Chang Klang District) as 3.985 (Table 6). The result of the evenness indices of indigenous vegetables on 10 stations were found the evenness indices of indigenous vegetables on stations of 7,4,2,10,5,9,8,3,1 and 6 are 0.828, 0.809, 0.808, 0.803, 0.729, 0.785, 0.779, 0.777, 0.722 and 0.609, respectively. The most of the evenness indices were shown on station 7 (Hua Sai District) and station 4 (Pi Poon District), the lowest of evenness indices were shown on station 6 (Chang District) as seen in Table 6.

Table 5. Kind of the indigenous vegetables (aquatic plant group) in Nakhon Si Thammarat province, Thailand

Scientific Name	Family		N	%
Kind of indigenous vegetables		Aquatic plant		
<i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	/	67000	1.581
<i>Lasia spinosa</i> L.	Araceae	/	59000	1.393
<i>Neptunia oleracea</i> Lour.	Fabaceae	/	31000	0.732
<i>Monochoria hastata</i> Solms	Pontederiaceae	/	20000	0.472
<i>Monochoria vaginalis</i>	Nymphaeaceae	/	10000	0.236
<i>Colocasia esculenta</i> (L.) Schott	Araceae	/	3700	0.087
Total of aquatic plant			190700	4.501
total of indigenous vegetables			4,236,978	100

Table 6. The diversity and evenness of indigenous vegetables in Nakhon Si Thammarat province, Thailand

Station	1	2	3	4	5	N
Total of indigenous	686,950	395,385	378,235	346,644	322,077	2,129,291
Station	6	7	8	9	10	
Total of indigenous	502,915	303,840	539,386	324,560	436,986	2,107,687
N						4,236,978
%						100
Station	1	2	3	4	5	
Diversity Indices	4.938	5.360	5.120	5.404	5.244	-
Station	6	7	8	9	10	
Diversity Indices	3.986	5.517	5.200	5.239	5.373	-
Station	1	2	3	4	5	
Evenness Indices	0.723	0.809	0.778	0.810	0.786	-
Station	6	7	8	9	10	
Evenness Indices	0.610	0.829	0.779	0.785	0.804	-

Remark : 1= Thong Song District, 2 = Si Chon District, 3=Pra Prom District, 4= Pi Poon District,
5= Chain Yai District, 6= Chang Klang District, 7= Hua Sai District , 8=Lanska District,
9= Tumbon Nam tok ,Thong Song District, 10= Bang Khan District

Discussion

The diversity and evenness of trees are varied by area and climatic around the world. In China, *Faguis* confined to the mountains of the evergreen broad-leaved forest zone in subtropical or warm temperate China (Wu, 1980 ; Hou, 1983). It is absent from temperate or cool temperate (Kira, 1991; Cao *et al.*, 1995). In Lisbon, Portugal, street tree community was dominated by *Celtisaustralis* L., *Tillia* spp., and *Jacaranda mimosifolia* D. which together counted 40% of tree population (Soares *et al.*, 2011). In Bangalore, India, the four most commonly found species; *Albiziasaman*, *Peltophorum pterocarpum*, *Spathodea campanulata*, and *Pongamia pinnata*, while *Albizia samanis* common species that was found less than 10% of the population (Nagendra and Gopal, 2010). The street trees on Nakhon Si Thammarat highway includes aspects of diversity, prevalence and environmental benefit provision. The approximated number of the street trees is 300,000 from 83 species, 69 genera, and 31 families (Choothong *et al.*, 2016). The diversity of trees on the Tapae canal waterside, Thong Song district, Thailand were found 1016 trees, 78 species, 65 genera and 39 families. The most abundance family are in GUTTIFERAE, PALMAE, Euphorbiaceae, respectively. The five most abundant are; 1) *Garcinia magostana* L. (13.78%); 2) *Elaeis guinensis* Jacq. (10.83%); 3) *Hevea brasiliensis* Muell. Agr. (8.86%); 4) *Bambusa* Sp. (7.19%) and 5) *Leuaena leucocephala* Lamk. (6.89%), respectively. The most of the diversity indices were founded on station seven 1.25 and the lowest diversity indices were founded on station two in 0.58. The most of the evenness indices was founded in the station six and station seven were 0.89 and 0.85, respectively. The lowest evenness indices were founded on station two 0.56 (Na Nakorn *et al.*, 2016a). The diversity and prevalence of tree in 16 schools had the approximated number of 243 trees and were found 242 species, 45 genera and 22 families, the most dominant family was Leguminosae. The benefit tree uses mainly for shading 78 percent and for landscaping and the aesthetics is 22 percent (Na Nakorn *et al.*, 2016b). Density, frequency and dominance of mangrove species at each station is different. The spread of the species due to several factors, among others: environmental conditions (soil type, pH, salinity, substrate, and current), the availability of propagules, type root sticking propagules, buoyancy propagules, breeding types of mangrove species, and competition among species. Another thing that affects the distribution of this species is a species usefulness to the needs of local communities (Zakaria and Nawaz Rajpar, 2015). The most abundance of the kind of mangrove trees in Thasala, Sichon and Pak Paneang district, Nakhon Si Thammarat's coastline were founded 16 species and 6 families of trees, it is the highest number of total mangrove trees is 3088 (78.28 percent). The second abundance were founded 4 species and 4 families of ground cover, it had the number of total ground cover from this experiment

is 557 (14.12 percent), The third abundance were founded 8 species and 7 families of shrub, it had the number of total shrub in this experiment is 288 (7.30 percent), The lowest abundance was founded 1 species and 1 families of climbing, it had the number of total climbing from this experiment is 12 (0.30 percent). The diversity and evenness of mangrove trees in Thasala, Sichon and Pak Paneang district were found 29 species and 18 families. The most abundance are *Avicennia alba* BL (31.05%), *Bruguiera cylindrical* L. (27.12%) and *Rhizophora apiculata* Blume (9.30%), respectively. The diversity indices were shown in Thasala, Pak Paneang and Sichon district are 0.67, 0.45 and 0.44, respectively. The evenness indices was shown in Thasala, Sichon and Pak Paneang district are 0.14 0.13 and 0.11, respectively (Na Nakorn *et al.*, 2018). Diversity of indigenous vegetables in Ta-Rae market Sakon Nakhon Province, Thailand during May 2005 to January 2006 they were identified 39 species, 39 genera and 30 families and 1 unknown. Indigenous vegetables were found excessively such as Cucurbitaceae, Leguminosae, Guttiferae, Limnocharitaceae, Menispermaceae and Convolvulaceae. Identified indigenous vegetables consumed as stem (2 species), leaves and young shoots (27 species), flower (15 species), fruit (7 species) and whole plant (5 species). Most of utilization methods were used as salad, steamed or boiled vegetables eaten with chili paste, mined meat, or seasoning in food ingredients (Chokthaweeapanich *et al.*, 2016). The reported of the study of species diversity and utilization of local vegetables in Khirimat district, Sukhothai Province, were founded 114 specimens classified into 52 families, 86 genera, 106 species. Leaves/shoots are mostly used followed by fruits/seeds, flowers, stems and roots, respectively. For easting, most plants were cooked by boiling, stir frying, steaming and frying for example, *Sesbania grandiflora* Desv., *Ipomoea aquatica* Forsk., *Leptonychia heteroclita* Kurz, *Sauropus androgynus* Merr., *Cinnamomum glaucescens* Drury, *Coccinia grandis* Voigt, *Cucurbita moschata* Decne., *Vigna sinensis* Savi ex Hassk., *Citrus hystrix* DC., *Sesbania javanica* Miq. and *Albizia lebbeck* Benth., by boiling, fast boiling and grilling for example, *Oroxylum indicum* (L.) Kurz. Some plants were eaten freshly for example, *Adenia viridiflora* Craib, *Terminalia chebula* Retz. var. *chebula* and *Phyllanthus emblica* L. (Ngamsiri and Thananoppakun, 2014). Also the diversity and evenness of indigenous vegetables in Thong Song District, Si Chon District, Pra Prom District, Pi Poon District, Chain Yai District, Chang Klang District, Hua Sai District, Lanska District District, Tumbon Nam tok, Thong Song District, Bang Khan District, Nakhon Si Thammarat Province, Thailand that differed from the other climate areas in the word.

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