

Ethnobotanical Survey of Vegetable Plants Traditionally Used in Kalasin Thailand

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Abstract—Use of plants grown in local area for edible has a long tradition in different culture. The indigenous knowledge such as usage of plants as vegetables by local people is risk to disappear when no records are done. In order to conserve and transfer this valuable heritage to the new generation, ethnobotanical study should be investigated and documented. The survey of vegetable plants traditionally used was carried out in the year 2012. Information was accumulated via questionnaires and oral interviewing from 100 people living in 36 villages of 9 districts in Amphoe Huai Mek, Kalasin, Thailand. Local plant names, utilized parts and preparation methods of the plants were recorded. Each mentioned plant species were collected and voucher specimens were prepared. A total of 55 vegetable plant species belonging to 34 families and 54 genera were identified. The plant habits were tree, shrub, herb, climber, and shrubby fern at 21.82%, 18.18%, 38.18%, 20.00% and 1.82% respectively. The most encountered vegetable plant families were Leguminosae (20%), Cucurbitaceae (7.27%), Apiaceae (5.45%), whereas families with 3.64% uses were Araceae, Bignoniaceae, Lamiaceae, Passifloraceae, Piperaceae and Solanaceae. The most common consumptions were fresh or brief boiled young shoot or young leaf as side dishes of 'jaeo, laab, namprik, pon' or curries. Most locally known vegetables included 45% of the studied plants which grow along road side, backyard garden, hedgerow, open forest and rice field.

Keywords—Ethnobotanical survey, Thailand, vegetable plants.

I. INTRODUCTION

VEGETABLES are usually taken from plants growing naturally or locally cultivated in areas occupied by consumers. Indigenous knowledge on edible vegetables present in traditional dishes in the plant relative areas. Ethnobotanical studies are usually significant in revealing locally important plant species for the discovery of dietary use and some tend to further extension for commercial purposes [1], [2]. Many indigenous vegetables were shown advantages over exotic vegetable species in tolerate to climatic change [3]. Amaranths, for example, were recognized as the most heat-tolerant crop or the pioneer plant and commonly defined as weed in commercial farming systems. However they were often left to grow for later harvesting in smallholder cropping systems of some arid areas such as Africa [3]. In addition

some plants provided important nutrients, mineral elements and significant amounts of dietary fibres. Traditional vegetable plants play an important role in contemporary diet for people in poor, rural areas [4]. In order to save their cost of living, some cultivated vegetable plants are grown as part of a mixed cropping system in home gardens or smallholder plots [5]. The original sources of seeds or sprouts were obtained from only selected popularity species presented in traditional dishes (consistent availability, ease of preparation, favourable taste) gathered via oral transferring among generations.

This study was purposed to investigate and document the traditional utilization of vegetable plants by the people of Amphoe Huai Mek, Kalasin Province, Thailand and to provide fundamental data in further comparison study to other areas.

II. MATERIALS AND METHODS

A. Study Area

Kalasin Province is situated within the Northeastern of Thailand and covered by hilly landscape. The province is subdivided into 18 districts (amphoe). Amphoe Huai Mek or Huai Mek district is in the western part of Kalasin, 58 km far from center of the province, and located at 16° 35' 24" N and 103° 14' 8" E. This amphoe is subdivided into 9 subdistricts (tambon) which are further subdivided into 84 villages (muban). Total area of Amphoe Huai Mek is 291.01 km² and a population is 50,982 (Male = 25,304, Female = 25,678) [6], [7]. Most of the people are farmers. Important cash crops are rice, sugar cane and cassava. The climate is warm with average high temperature of 32.1°C, average low temperature of 21.3°C and average precipitation per year of 1,198 mm. The families living in rural area are generally poor and earn their members by agriculture and producing the silk and weaving mat from sedges [8]. The study sites were selected based on extensive use of traditional vegetables by the community in this amphoe on the basis of living a moderate, self-dependent life without overexploitation of natural resources for future sustainable utilization.

B. Data Collection

The ethnobotanical approach was applied to explore and accumulate the indigenous knowledge being transferred by the local people. The data on vegetable plants traditionally used were commonly collected by means of a pre-set data capture questionnaire, interviews and transect walks. The information of the interviewees such as age and education were recorded. The questionnaire was determined to provide important information of the mentioned vegetable plants, such as local

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names, source of the plant materials, parts used in cooking recipes, harvesting, and methods of their preparation.

Calculation of use value (UV) for demonstration of the relative importance of species known locally in form of vegetables was done by the method provided by Trotter and Logan [9].

C. Collection of Plant Samples and Identification

Plants reportedly used as vegetable were collected from natural vegetation and home gardens by a group of people comprising of interviewees and researchers from Silpakorn University, Nakhon Pathom, Thailand. The plants were identified both in the fields and laboratory by taxonomist and voucher specimens were deposited at the Biology Department, Silpakorn University, Nakhon Pathom. The information gathered included the vernacular name of the plant, species, habitat, and parts used. In addition, a photograph of each plant was also taken.

III. RESULTS

A. Demographic Characteristic of Study Interviewees

The determination of demographic characteristics of 100 respondents from 36 villages of 9 districts in Amphoe Huai Mek, Kalasin, Thailand was done through face-to-face interviews. The age of participating people were in range of 35-70 years. Of the interviewees, 42 were male, 58 were female. On the basis of education background, a total of 53 of them were primary school graduate, whereas 32, 12, and 3 were secondary school, high school, and university graduates respectively.

The family names, species name, vernacular name(s), habit, habitat, parts used, and usage or preparation methods of each plant species were shown in Table I. The voucher specimens were deposited at the faculty of Science, Silpakornuniversity, Nakhon Pathom, Thailand. The vegetable plants recorded were 55 species belonging to 54 genera and 34 families. The plant form or habit was mostly present as herb at 38.18%, following by tree, climber, shrub, and fern at 21.82%, 20.00%, 18.18% and 1.82% respectively. The family Leguminosae had highest species members utilized as vegetables of 20%, followed by Cucurbitaceae (7.27%) and Apiaceae (5.45%), whereas families with 3.64% uses were Araceae, Bignoniaceae, Lamiaceae, Passifloraceae, Piperaceae and Solanaceae. The most common traditional consumptions of vegetables were fresh eating or brief cooking by boiling or grilling of young shoot or young leaf prior consume as side

dishes of traditional hot dip such as 'jaeo, nam prik, pon' or half cooked spicy minced meat such as 'laab' or varieties of curries. Most locally known vegetables (UV closed to 1) included 45% of the studied plants which grow along road side, backyard garden, hedgerow, open forest and rice field.

IV. DISCUSSIONS

Most of traditional knowledge on utilization of plants grown wildly or naturally in homeland were inherited and transferred from relatives. The pattern of knowledge transfer and tendency of secrecy are similar to studies of medicinal plants traditionally used in many countries where own limited indigenous plant resources [10], [11]. The ages of participants who know indigenous vegetable plants and their habitat including methods of preparation for proper dishes with favorable tastes, were ranged between 35-70 years. This may reveal the duration of knowledge acquired to increasing the skill on seeking the raw materials, recipes, preparation and methods of cooking those plants for traditional food.

TABLE I
PLANTS USED AS VEGETABLES IN AMPHOE HUAI MEK, KALASIN PROVINCE, THAILAND

No	Family	Species	Vernacular name	Plant part (s) used ^a	Usage ^b	Habitat ^c	Habit ^d
1	Acanthaceae	<i>Asystasia gangetica</i> (L.) T. Anders.	Phakomsaep-ผักอ้อมเขน-	St, Lf	SS	BG	S
2	Alismataceae	<i>Limncharis flava</i> (L.) Buchenau	Phakphai-ผักพาย	St, Fl	FE	W	aqH
3	Amaranthaceae	<i>Amaranthus spinosus</i> L.	Phakhomyai-ผักหนามใหญ่	St, Lf	CO	BG	H
4	Apiaceae	<i>Anethum graveolens</i> L.	Phak chi lao-ผักชีลาว	St, Lf	SS	BG	H
5	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Phaknok-ผักหนอก	Lf	FE	OF, RF	H
6	Apiaceae	<i>Eryngium foetidum</i> L.	Phakhompe-ผักหอมเป	St, Lf	FE	BG	H

No	Family	Species	Vernacular name	Plant part (s) used ^a	Usage ^b	Habitat ^c	Habit ^d
7	Apocynaceae	<i>Telosmacordata</i> (Burm. f.) Merr	Phakkhik-คักจิก	Fl	CO	R	C
8	Araceae	<i>Lasiapinnosa</i> (L.) Thwaites	Phaknam-คักนาม	St, Lf	CO	BG	H
9	Araceae	<i>Wolffiaglobosa</i> (Roxb.) Hartog&Plas	Pham-คัม	Pl	RC	W	aqH
10	Araliaceae	<i>Macropanaxdispermus</i> (Blume) Kuntze	Phakphia fan-คักเฟียฟาน	St	FE	Hed	S
11	Basellaceae	<i>Basellaalaba</i> L.	Phakplang-คักปลั่ง	St, Lf, Fl	CO, SS	Hed	C
12	Bignoniaceae	<i>Fernandoaadenophylla</i> (Wall. ex G.Don) Steenis	Phakkhao-คักเหอ้าว	St, Lf, Fl	CO, RC	R, RF	T
13	Bignoniaceae	<i>Oroxylumindicum</i> (L.) Kurz	Mak-lin-fa-หมากลิ้นฟ้า	St, Fl, Fr	FE, CO	R, OF	T
14	Cleomaceae	<i>Cleomegynandra</i> L.	Phaksian-คักเซียน	Pl	P	W	H
15	Compositae	<i>Acmeallaolera</i> (L.) R.K.Jansen	Phakhrat-คักคราด	St, Fl	RC	BG, RF	H
16	Cucurbitaceae	<i>Cocciniagrandis</i> (L.) Voigt	Phaktamin-คักดามิน	St, Lf	CO	Hed	C
17	Cucurbitaceae	<i>Cucurbitamoschata</i> Duchesne	Makue-หมากอู	St, Lf, Fl, Fr	CO	BG	C
18	Cucurbitaceae	<i>Luffacylindrica</i> (L.) M.Roem.	Buaphom-บวบหอม	St, Fl, Fr	RC	Hed	C
19	Cucurbitaceae	<i>Momordicacharantia</i> L.	Phaksai-คักไซ	Lf, Fr	CO	Hed, RF	C
20	Hydrocharitaceae	<i>Otteliaalismoides</i> (L.) Pers.	Phakhophap-คักโหมหม	Lf, Fr	FE	RF	aqH
21	Hypericaceae	<i>Cratoxylumformosum</i> (Jacq.) Benth. & Hook.f. ex Dyer	Phaktio-คักเตี้ยว	St, Lf	FE, SS	OF, RF	T
22	Lamiaceae	<i>Ocimumamericanum</i> L.	Phakitu-คักอิตู	Pl	RC	BG	H
23	Lamiaceae	<i>Plectranthusamboinicus</i> (Lour.) Spreng.	Phakhusuea-คักหูเสือ	Lf	FE	BG	H
24	Lecythidaceae	<i>Barringtoniaacutangula</i> (L.) Gaertn.	Kradonnam-กระโดนน้ำ	St, Lf	FE	RF	T
25	Leguminosae	<i>Acaciapennata</i> (L.) Willd. subsp. <i>insuavis</i> (Lace) I.C.Nielsen	Phakpha-คักฟา	St	CO, RC	BG	S
26	Leguminosae	<i>Adenanthepavonina</i> L.	Phakbak lam-คักบักลำ	St, Lf	RC	RF	S
27	Leguminosae	<i>Bauhiniamalabarica</i> Roxb.	Somsiao-ส้มเสี้ยว	Lf	FE	RF	T
28	Leguminosae	<i>Caesalpiniamimosoides</i> Lam.	Phakkyatya-คักกายตา	St, Lf	FE	BG	Sc
29	Leguminosae	<i>Droogmansiaodefroyana</i> (Kuntze) Schindl.	Phak ton-คักตัน	Lf	FE	RF, W	S
30	Leguminosae	<i>Lablabpurpureus</i> (L.) Sweet	Thuapaep-ถั่วเปป	St, Fr	FE, RC	Hed	C
31	Leguminosae	<i>Leucaenaleucocephala</i> (Lam.) de Wit	Kra thin-กระถิน	St, Lf, Fr	FE	Hed, RF	S/T
32	Leguminosae	<i>Neptuniaolera</i> Lour.	Kasetnam-กระแตงั่ว	St, Lf	FE	W	aqH
33	Leguminosae	<i>Psophocarpustetragonolobus</i> (L.) DC.	Thuaphu-ถั่วพู	Fr	FE, CO, RC	Hed	C
34	Leguminosae	<i>Sennaoccidentalis</i> (L.) Link	Phaklenkhet-คักเล็นเค็ด	St, Lf	CO	OF, RF	S
35	Leguminosae	<i>Sennasiamea</i> (Lam.) H.S.Irwin&Barneby	Khilek-ขี้เหล็ก	St, Lf, Fl	CO	R, RF	T
36	Meliaceae	<i>Azadirachtaindica</i> A.Juss.	Sadao-สะเดา	St, Fl	FE, CO	R, OF	T
37	Menispermaceae	<i>Tiliacoratriandra</i> Diels	Yanang-ย่านาง	Lf	SQ	Hed	C
38	Molluginaceae	<i>Glinusoppositifolius</i> (L.) Aug.DC.	Phakkaenkhom-คักแก่นขม	Pl	RC, FE	RF	H
39	Moringaceae	<i>Moringaoleifera</i> Lam.	Phaki hum-คักฮูม	St, Fr	CO	Hed	T
40	Myrtaceae	<i>Syzygiumantisepticum</i> (Blume) Merr. & L.M.Perry	Phakmek-คักเม็ก	St, Lf	FE	Hed, RF	S/T
41	Onagraceae	<i>Ludwigiaadscendens</i> (L.) H. Hara	Phak pot nam-คักปอดน้ำ	St	FE	W	aqH
42	Oxalidaceae	<i>Averrhoacarambola</i> L.	Makfueang-หมากเฟือง	Fr	FE	R	S/T
43	Passifloraceae	<i>Adeniaviridiflora</i> Craib	Phaki nun-คักอินุ่น	St, Lf, Fr	CO	RF	C
44	Passifloraceae	<i>Passifloraedulis</i> Sims	Krathokrokfarang-กระทอกฝรั่ง	St, Lf, Fr	CO	Hed, R	C
45	Phyllanthaceae	<i>Sauropusandrogynus</i> (L.) Merr.	Phak wan ban-คักหวานบ้าน	St, Lf	RC	OF, RF	S
46	Piperaceae	<i>Peperomiapellucida</i> (L.) Kunth	Phakkra sang-คักกะสัง	St, Lf	FE	OF, RF	H
47	Piperaceae	<i>Pipersarmentosum</i> Roxb.	Phakiloet-คักอีเล็ท	Lf	FE, RC	BG	H
48	Plantaginaceae	<i>Limnophilaaromatica</i> (Lam.) Merr.	Phakkayaeng-คักกะเยง	St	RC	RF	H
49	Polygonaceae	<i>Polygonumodoratum</i> Lour.	Phakpao-คักเพา	St, Lf	FE, RC	BG	H
50	Pontederiaceae	<i>Monochoriavaginalis</i> (Burm.f.) C.Presl	Phakihin-คักฮิน	Pl	FE	RF	aqH
51	Rhamnaceae	<i>Colubrinaasiatica</i> (L.) Brongn.	Phakkantrong-คักกันตรวง	St, Lf	RC	R, RF	S
52	Rubiaceae	<i>Morindacitrifolia</i> L.	Yo-ยอ	Fr	FE	R	T
53	Solanaceae	<i>Lycopersiconesculentum</i> Mill.	Ma khueakhuea-มะเขือเทศ	Fr	RC	BG	H
54	Solanaceae	<i>Solanumrudemannum</i> Dunal	Makphaeng-หมากแข้ง	Fr	FE	BG	S
55	Woodsiaaceae (Pteridophytes)	<i>Diplaziumesculentum</i> (Retz.) Sw.	Phakkut-คักกุด	St, Lf	CO	BG	Fer

^aPlant part (s) used: St, shoot; Lf, leaf; Fl, Flower bud; Fr, fruit, Pl, whole plant.^bUsage: CO, Cook by boiling, brief boiling, or steaming; FE, fresh edible or as side dish of 'jaeo, koi, lab, nam prik, pon, somtum'; P, pickle; RC, recipe in curry; SQ, squeeze for watery substance and use as recipe in curry; SS, seasoning.^cHabitat: BG, backyard garden; Hed, along the hedgerow; OF, open forest; R, road side; RF, rice field or farmland; W, swampy areas, canal, lake, river.^dHabit: C, climber; H, herb; aqH, aquatic herb; Fer, fern; S, shrub; Sc, scandent; T, tree.

Similar to ethnobotanical study on utilization of indigenous plants for other purposes (e.g. medicinal); herb and climbing plants were the first major groups being consumed [12]. An herb possesses less persistent woody tissue in all vegetative organs than tree or shrub, whereas climber has many young climbing shoots during their short developing stage. In contrast, tree and shrub require longer period to develop new branch, shoot, or fructification. Therefore the choice of use for specific plant form is usually base on knowledge transfer from one generation to the next. In addition climatic and other environmental factors e.g. seasons, temperature and humidity of that area also play roles to suitability target plants for consumption. The family Leguminosae, Cucurbitaceae and Apiaceae are recognized as important vegetable families[1], the study herein support this document by resulting report of indigenous vegetable species belonging to these 3 families as 20%, 7.27%, and 5.45% respectively. More than half of the total vegetable production in Central Asia and the Caucasus come from various indigenous vegetables of either original species or exotic species [2]. About a half of a thousand plant species used as food in Southeast Asia originated from indigenous vegetation and primitive cultivars. About 27.3% of species presented herein (i.e. *Coccinia grandis*, *Luffa cylindrica*, *Momordica charantia*, *Solanum rudi-pannum*, *Neptunia oleracea*, *Leucaena leucocephala*, *Senna siamea*, *Psophocarpus tetragonolobus*, *Oroxylum indicum*, *Centella asiatica*, *Piper sarmentosum*, *Diplazium esculentum*, *Moringa oleifera*, *Telosma cordata*, and *Morinda citrifolia*) were also previously reported as indigenous species of under-utilized vegetable in Thailand [13]. After trial and error of local people in creation of traditional dishes, some species are taken out from their natural habitat, moving into human household and being cultivated in home gardens or mixed with commercial or cash crops to allow alternative supply for home consumption [1]. In order to raise exploitation of newer indigenous plant species for commercial cultivation to approach food requirement, survey and documentation of these species in many areas are necessary [1]. Basic data on plant species names and utilizations derived from further comparative researches may provide appropriate knowledge management on conservation of genetic resources, and culture exchange via traditional foods.

V. CONCLUSION

Vegetable plants traditionally used by local people in Amphoe Huai Mek, Kalasin were harvested from natural vegetation, home gardens; roadsides, rice fields or farmlands, hedgerow or live fences and swampy areas. The plant species with life form of herb have rapid growth and abundance in wet season. They also contain less woody tissue than of other habits, effecting to pattern of consumption as fresh vegetables. However new young shoot of tree and shrub are also edible in the similar pattern, under skill of identification passed orally by generation to generation. Further explorations of indigenous vegetable plants used traditionally in other areas of the country are necessary, to accumulate knowledge of species whose nutritive properties suitable for the benefit of people to

have self-dependent life without overexploitation of natural resources for future sustainable utilization.

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