

USE OF *CAPSICUM* BY KHMER AND OTHER ETHNIC GROUPS IN CAMBODIA

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Introduction

Capsicum peppers (approximately 25 species) are native to tropical and temperate regions of the Americas¹, and four domesticated and one semi-domesticated species have been identified: *C. annuum*, *C. chinense*, *C. baccatum*, and *C. pubescens* (domesticated) and *C. frutescens* (semi-domesticated, with characteristics such as seed dormancy, small fruit size, deciduous fruit, and inhibition of flowering under long days).² Two of these species, *C. annuum* and *C. frutescens*, are now widely cultivated throughout the world and are economically important as condiments, vegetables, and medicines.

Capsicum was introduced into Asia before the sixteenth century.³ Yamamoto and Nawata⁴ have studied the distribution, dispersal routes, and domestication of *C. frutescens* in Southeast and East Asia based on morphological, physiological, and biochemical traits of genotypes. They found that accessions of *C. frutescens* from the Ryukyu Islands in Japan are closely related to those from Taiwan, the Batanes Islands in the Philippines, and Indonesia because they have a rare isozyme pattern, the shikimate dehydrogenase phenotype B, which is not found in continental regions of Southeast Asia. They suggested that *C. frutescens* was introduced from Indonesia *via* the Philippines and Taiwan to the Ryukyu Islands.

To elucidate the dispersal and distribution of *C. frutescens* in Southeast and East Asia, it is necessary to survey distribution of the shikimate dehydrogenase phenotype B isozyme pattern in the continental region. However, very few genotypes of the genus *Capsicum* have been collected from Cambodia, and there is little information on local nomenclature and detailed usage of *Capsicum* in Cambodia.

¹ Eshbaugh 1993.

² Yamamoto and Nawata 2004, 2006, 2009b; Yamamoto *et al.* 2007, 2008.

³ Andrews 1993; Kumazawa *et al.* 1954; Sturtevant 1885.

⁴ Yamamoto and Nawata 2004, 2005, 2009a.

In this study, the local nomenclature and use of *Capsicum* by Khmer and other ethnic groups in Cambodia were surveyed to reveal the relationship between people and *Capsicum*, i.e., *Capsicum* culture, in Cambodia.

1. Study site and data collection

Fieldwork was conducted for a total of 2 months in August, September, November, and December 2008. The work consisted of interviews and plant observations of *Capsicum* species. The study sites are shown in Fig. 1. We interviewed 122 local people (61 male, 61 female; 71 Khmer, 1 Khmer Khe (Khmer Khork), 3 Suoy, 2 Kuy, 2 Brao, 6 Krung, 1 Kravet (Kavet), 1 Lun, 5 Tampuan, 16 Phnong, 1 Kachok, 6 Jarai, and 7 Lao; referring to Center for Advanced Study [2009] about ethnic groups) regarding the local nomenclature and use of the genus *Capsicum*. The interviewees were 23 to 80 years old, with a median age of 46.

2. General information on *Capsicum* in Cambodia

Two species of *Capsicum* are used in Cambodia: *C. annuum* (white flower, Fig. 2A; or occasionally purple, Fig. 2B) and *C. frutescens* (greenish yellow flowers, Fig. 2C). Varieties of *C. annuum* (e.g., *mates dai neang* as a spice, *mates phlaok* as a vegetable, and *mates leak* as an ornamental) are economically very important in Cambodia, but *C. frutescens* is mainly cultivated in home gardens, is often used fresh for seasoning foods in the daily diet, and has become an important and indispensable condiment.

Fruits of *mates dai neang* were sold in every market, and a channel of distribution for *mates dai neang* seemed to be already established (Fig. 2D). However, fruits of *C. frutescens* sold in markets were mostly collected from plants cultivated near the markets (or in the same province), and the main type of fruit of *C. frutescens* varied according to locality (provincial markets). For example, 1: two types (green immature fruit color and greenish yellow immature fruit color) were sold in Pursat and Kracheh (Fig. 2E), 2: almost only small fruits (green immature fruit color type) were sold in Battambang, 3: big fruits (green immature fruit color type) were mainly sold in Ratanakiri, and 4: fruits of greenish yellow immature fruit color type were mainly sold in Kampong Thom and Steung Treng. A handful of fruits of pungent *Capsicum* was sold for 100 Riel (6000–20000 Riel per kilogram, depending on fruit. 1 US \$=4200 Riel at the time this survey was conducted), and decorative fruits (7–10 fruit tied together with a rubberband) were also sold (Fig. 2F). Not only fruits but also leaves of *C. frutescens* were sold for 200 to 500 Riel per bundle in Kampong Speu, Kampong Chhnang, Pursat (15 branches at 300 R), Kampong Cham (7 branches at 200 R), and Steung Treng (14 branches at 300 R) (Fig. 2G).

3. Local nomenclature for *Capsicum*

3.1. Khmer

The Khmer generally call *Capsicum mates* and distinguish *C. annuum* from *C. frutescens* by adding words to *mates* (Table 1). Local names for *C. annuum*, such as *mates dai neang* (ring finger), *mates leak* (color), and *mates phlaok*, were used very widely and evenly across Cambodia. *Mates dai neang* and *mates phlaok* were especially well known to the Khmer (34 and 57 of 71 interviewees, respectively, knew these local names). In contrast, *mates krochok neang* (*krochok*: nail, *neang*: young lady), which is the same as *mates dai neang*, was used mainly in central to southern regions of Cambodia, and *mates Kuy* (Kuy, ethnic group) was used only in Siem Riap Province. It is unknown whether the Kuy introduced a variety of *mates* to the Khmer, but *mates kuy* will be an important local name in the study of dispersal routes of *Capsicum* in Cambodia. Other local names for *C. annuum* were names related to fruit shape: *mates chongkaom* (cluster), *mates chong'ool mek* (pointing toward the sky), *mates chung moan* (*chung*: foot, *moan*: chicken), *mates khnay moan* (spur of chicken), *mates lew aw* (button), and *mates veeng* (long); ornamental use: *mates toeur* (dwarf); introductions from other regions: *mates thai* and *mates hawaii* (Table 1).

Local names for *C. frutescens*, such as *mates ach sat* (*ach*: droppings, *sat*: animal), *mates kedor chma* (*kedor*: penis, *chma*: cat), and *mates sor* (white) (27, 31, and 41 among 71 interviewees, respectively, knew these local names), were also used very widely in Cambodia (Table 1). In contrast, *mates brang* (French or Westerner) was used in Battambang, Banteay Meanchey, and Siem Reap, and *mates khmang* (enemy) was used mainly in Kampong Chhnang, Kampong Speu, Takaev, and Prey Veng. The local names *mates kor muy* (*kor*: cattle, *muy*: one in figures), *mates marech* (pepper, *Piper nigrum*), and *mates miyaw* (cat) were used by Khmer living in regions dominated by minorities (Suoy or Kuy). Local names of minorities for *mates* may have influenced Khmer names. Other local names for *C. frutescens* were related to animal droppings: *mates ach chaap* (*ach*: droppings, *chaap*: sparrow), *mates ach chma* (*chma*: cat), and *mates ach kondao* (*kondao*: rat); related to fruit shape or color: *mates chmar* (thin, small), *mates daam chmar* (*daam chmar*: thin stem), *mates khmav* (black), *mates keon preach* (*keon*: kid, *preach*: small), and *mates srov* (a grain of rice); related to taste: *mates chnas* (to be mean, troublesome); and others: *mates kuyteav* (noodles) and *mates prei* (wild) (Table 1).

3.2. Other ethnic groups

Khmer Khe and Suoy generally also called *Capsicum mates*, but the general name for *Capsicum* was *bhlach*, *marach*, *marech*, which seems to be derived from the same word for *Piper nigrum*, in Kuy, Brao, Krung, Kravet, Lun, Tampuan, and Phnong, *n(g)chaang* in Kachok, *hang* (*hang* also means hot) in Jarai, and *maak phit* (*maak*: fruit, *phit*: hot) in Lao (Table 2). They tended to add the following words to the general name for *Capsicum* to distinguish *C. annuum* from *C. frutescens*: spur of chicken (Brao, Krung, Kravet, Lun, and Tampuan), water buffalo horn (Phnong), ivory (Lao), and *phrook*, *trrok*, *phook*, *phoom* (*mates phlaok* type) for *C. annuum*; cat, bird, animal droppings, and color (white) for *C. frutescens* (Table 2). Some people also added words related to other countries or ethnic groups: Vietnam by Tampuan and Phnong for a long fruit type of *C. annuum*, Thai by Brao and Lao, Khmer by Krung, Lao (and *nge*, meaning Nge in Laos, under investigation)

by Jarai, and Jarai by Phnong for *C. frutescens*. These local names seem to indicate introduction of *Capsicum* from specific regions or ethnic groups, similar to *mates kuy* in Khmer. However, the Phnong said that there was no relationship between *marach jarai* and the Jarai.

In Japan, people call *Capsicum to-garashi* (*to*: Tang Dynasty, i.e., China, *karashi* [garashi]: a type of mustard) named after introduction from China, and also sometimes *nanban-kosho* (*nanban*: European, *kosho*: *Piper nigrum*) named after introduction by European trade. However, *to* and *nanban* sometimes mean that something is just from “abroad.” Therefore, Kuy, Vietnam, Thai, Khmer, Lao, and Jarai mean introduction not only literally from these regions but also just from “outside.”

Commonalities in local nomenclature between Khmer and other ethnic groups were that they added, e.g., “spur of chicken” for *C. annuum* and “cat, bird, animal droppings, and white” for *C. frutescens* to the general name for *Capsicum*. In Thailand, next to Cambodia, people call *C. frutescens* *phrik kii nuu* (*kii*: droppings, *nuu*: rat) or *phrik kii nok* (*nok*: bird) as in Cambodia. Two hypotheses could explain this phenomenon: 1: a local name, e.g., “rat droppings chili,” would have been introduced with the plants or fruits from somewhere and translated into the local language, or 2: the local names could have arisen locally and separately in a cultural context.

4. Perception of taste of pungent *Capsicum*

The results of interviews with 122 people about hotness, smell, and preference for pungent *Capsicum* are shown in Table 3. Among the 122 people, 107 thought *C. frutescens* was hotter (104 people thought small fruits of green immature fruit color type [GR] were hotter; 3 thought fruits of greenish yellow immature fruit color type [GY] were hotter in *C. frutescens*), 5 thought *C. annuum* was hotter, and 10 thought *C. frutescens* was as hot as *C. annuum*. Many people said, “Fruits smaller, much hotter.” As to smell, 65 people thought *C. frutescens* smelled better (GR: 59, GY: 6), 2 thought *C. annuum* smelled better, and 55 thought there was no difference in smell between *C. frutescens* and *C. annuum*. As to preference, 88 people preferred to eat *C. frutescens* (GR: 78, GY: 10), 10 preferred to eat *C. annuum*, and 24 had no preference. Those who preferred spicy flavors tended to answer that the small fruits of *C. frutescens* were better for hotness and smell and for eating: “Small fruits are much hotter and more delicious, and their hotness does not continue so long in my mouth” (Ampil Ph’aem, Krang Chek, Oudong, Kampong Speu, Khmer, female, 35 years old), “*Mates ach sat* has a different hotness from other *mates* and is more delicious” (Kouk Trach, Khnat, Puok, Siem Reap, Khmer, male, 46 years old), and “*Mates dai neang* is not delicious because its pericarp is thick and its taste and flavor are not good” (Slaeng, Tuol Khpos, Tuek Phos, Kampong Chhnang, Khmer, male, 23 years old). However, those who did not prefer spicy flavors tended to eat *C. annuum* or fruits of *C. frutescens* having greenish yellow immature fruit color because they were less hot: “I do not often eat spicy foods, but I use a long fruit of *mates* when eating spicy foods because it is not very hot” (Kraom, Preah Rumkel, Thala Barivat, Steung Treng, Khmer, female, 31 years old), “I prefer to eat *marach ngeeraphom*

because it is not so hot” (Kong Rae, Sokh Sant, Kaoh Nheack, Mondolkiri, Phnong, female, 46 years old), and “*Mates khmang* is too hot, so I prefer to eat *mates sor*” (Ou, Krang Chek, Oudong, Kampong Speu, Khmer, male, 63 year old).

5. Weedy forms of *Capsicum* and bird behavior toward fruits

Spontaneous plants (wild or weedy plants) of *C. frutescens* are often found at forest edges or along roadsides in villages in Southeast and East Asia. Among the 122 interviewees, 111 had seen weedy forms of *Capsicum*, and 22 people said on their own initiative that birds ate fruits and that the seeds germinate from their droppings (Table 4). Almost all (120 of 122) interviewees knew or had seen that birds ate fruits of pungent *Capsicum*, and 18 mentioned that birds ate “red” fruits. Some people transplanted weedy forms of *C. frutescens* to their home gardens: “I transplanted weedy forms of *mates ach chaap* to a pot made from a stem of palmyra palm (*Borassus flabellifer*)” (Svay Tong, Khvav, Samraong, Takaev, Khmer, male, 64 years old) and “I transplant weedy forms of *mates kdor chma* to my home garden if I find them in a mountain area” (Khvit Tuol Khleang, Kbal Tuek, Tuek Phos, Kampong Chhnang, Khmer, female, 51 years old). Birds, such as chickens, minahs, sparrows and various small birds (*Zosterops* spp., etc.), eat *Capsicum* irrespective of ethnic group (Table 5). Some Khmer said that they rub and wind a tongue of their *sarikakeo* (minah) with a ring, and feed fruits of *mates* to *sarikakeo* to make it learn words quickly (Fig. 3A). Although we asked about birds, a few people said that ants ate fruits of *Capsicum*. From our experience at a hotel in Mondolkiri, dried *Capsicum* fruits left on a bed were gnawed by rats, and ants carried away broken pieces.

6. Use of *Capsicum* in Cambodia

6.1. Fresh or dried fruit (Khmer and other ethnic groups)

Fruits of *Capsicum* were eaten fresh and also added to noodles or soup. Sliced or squashed fruits were placed in salt and used as a dipping sauce for hard fruits such as *ampil* (tamarind, *Tamarindus indica*), *kvat* (*Limonia acidissima*), and *traabae* (guava, *Psidium guajava*). Suoy in Aoral, Kampong Speu, pounded not only fruits but also young leaves for making dipping sauce. Dried fruits were also used as seasoning powder for soup or *num banchok* (Khmer rice noodle) for domestic use (Table 6). Some people said that they used dried fruits especially in the dry season because they could not collect fresh fruits. Minorities used dried fruits in their home more than the Khmer, probably because of a more self-sufficient lifestyle and limited access to market: “We use dried fruits of *mates* in the dry season because plants wither and die in that season” (Kaoh Doun Teay, Trapeang Chour, Aoral, Kampong Speu, Suoy, male, 43 years old), “I collect fruits of *hang* in a field, and I dry them for use in the dry season” (Pralai, Lum Choar, Ou Ya Dav, Ratanakiri, Jarai, male, around 55 years old), and “I used to dry fruits of *bblech* by myself for use in the dry season, but now I can buy fresh fruits in a market” (Katout, Kamphum, Sesan, Steung Treng, Brao, male, 58 years old).

6.2. Processed or preserved fruits

6.2.1. Khmer

The Khmer processed or preserved fruits of *Capsicum*. They salted fruits in small bottles or soaked them in liquid, such as unboiled water, boiling water, liquid left over from boiling rice, and *tek tnaot chu* (palm wine) or *tek tnaot aem* (palm juice) (Table 6). In the Ryukyu Islands in Japan, *koregusu* is made by soaking *C. frutescens* fruits in *anamor*i (a Japanese spirit), as is also done by indigenous peoples in Taiwan, and *bagun* is made in the Batanes Islands by soaking fruits in *silam* (vinegar made from sugar cane).⁶

[Salted fruits]: “I salt fruits after removing calyxes. Taste of salted fruits becomes hotter and sourer if kept longer. Salted fruits can keep about 6 months” (Peani, Peani, Kampong Tralach, Kampong Chhnang, Khmer, male, 50 years old) and “I boil fresh fruits of *mates* and put them in a bottle with salt, garlic, and fish sauce” (Ou Rumchek, Samlout, Samloat, Battambang, Khmer, female, 37 years old, moved from Takaev in 2005).

[Soaked in unboiled water]: “I put fresh fruits of *mates*, unboiled water, and salt in a bottle” (Fig. 3B; Daeum Phdiek, Traeng Trayueng, Phnum Sruoch, Kampong Speu, Khmer, male, 27 years old, moved from Kampong Cham in 1999) and “I fry fresh fruits of *mates* without oil, and I put them in a bottle with salt, sugar, fish sauce, and unboiled water” (Kranhung, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, male, 37 years old).

[Soaked in boiling water]: “I put fresh fruits of *mates*, salt, *angkrong* (ants), garlic, and boiling water in a bottle. I can use it for 3 years” (Fig. 3C; this tasted a little sour and smelled of garlic; Kansaom Ak, Samraong, Samraong, Takaev, Khmer, male, 35 years old), “I boil water and make it cooler, and I add fruits of *mates* and salt. Two to three days later, I can use it. These fruits have been soaked for 10 days [Fig. 3D]. If it is salty, or if I add salt properly, I can use it for a long time” (Trapeang Kraol, Sala Visai, Prasat Balangk, Kampong Thom, Khmer, female, 50 years old, moved from Takaev in 1967), and “I fry fresh fruits of *mates* without oil, and put fruits of *mates*, salt, sugar, garlic, *bi cheng* (Ajinomoto or monosodium glutamate), and boiled water, which is still warm, in a bottle” (Peam, Doun Kaev, Puok, Siem Reap, Khmer, male, 37 years old).

[Soaked in liquid left over from boiling rice]: “I put fresh fruits of *mates*, salt, and leftover liquid from boiled rice in a bottle. I can use it 3 days later, and it keeps for 1 month” (Kbal Teahean, Chheu Tom, Krakor, Pursat, Khmer, female, 33 years old; Anhchanh Rung, Anhchanh Rung, Baribour, Kampong Chhnang, Khmer, male, 62 years old).

[Soaked in *tek tnaot chu* or *tek tnaot aem*]: “I put only fresh fruits of *mates*, salt, and *tek tnaot chu* in a bottle” (Fig. 3E; it tasted very salty; Mkak, Snam Krapeu, Kong Pisei, Kampong Speu, Khmer, male, 42 years old), “I put fruits of *mates* with old *tek tnaot chu*, garlic, and sugar. It can keep about 1 year. I carry it everywhere I go because I love it” (Pnov, Pnov, Santuk, Kampong Thom, Khmer, male, 43 years old), and “I put only fresh fruits of *mates* and *tek tnaot aem* or *tek tnaot chu* in a bottle” (Taprey, Pongro, Baray, Kampong Thom, Khmer, male, 38 years old).

⁶ Yamamoto and Nawata 2009a.

[Other]: “I put fresh fruits of *mates* and fish sauce in a small bottle. I can use it 6 days later, and it can keep 1 to 2 months. I use it as a dipping sauce with juice of citrus fruits and *bi cheng*” (Tuol Prum Muoy, Kakaoh, Moung Ruessei, Battambang, Khmer, female, 39 years old) and “I put fresh fruits of *mates* with *sraa sor* (rice liquor), garlic, *bi cheng* in a bottle, and I leave it in the sun. I can use it 2 days later, and it keeps half a month” (Chheu Kach, Chheu Kach, Ba Phnum, Prey Veng, Khmer, male, 36 years old).

One of the most important elements of soaking fruits in liquid seemed to be the “sour” taste. Liquid left over from boiling rice becomes sour from lactic acid fermentation if kept at room temperature, and palm juice or palm wine also become sour at room temperature. Some people added ants or citrus juice for a sour taste. However, some people thought that the sour taste indicates rotting: “I fry fresh fruits of *mates* without oil, and I put them in a bottle with boiled water and salt. I can use it 2 to 3 days later, and it can keep more than 1 week. If it tastes sour, I throw it away” (Ruessei, Rohal, Preah Netr Preah, Banteay Meanchey, Khmer, male, 55 years old).

6.2.2. Other ethnic groups

Other groups processed or preserved fruits of *Capsicum* in much the same way as Khmer but did not use *tek tnaot chu* or *tek tnaot aem* when soaking fruits (Table 6).

[Salted fruits]: “I salt fruits of *mates*” (Kaoh Doun Teay, Trapeang Chour, Aoral, Kampong Speu, Suoy, female, age no data).

[Soaked in unboiled water]: “I put only fresh fruits of *mates*, salt, and unboiled water in a bottle” (Kaoh Doun Teay, Trapeang Chour, Aoral, Kampong Speu, Suoy, male, 43 years old) and “I put fresh fruits of *marech*, salt, *bi cheng*, and unboiled water. I eat it when it becomes sour, and it keeps only around 10 days” (Chuoy, Ta Veang Leu, Ta Veang, Ratanakiri, Krung, male, 40 years old).

[Soaked in boiled water]: “I boil water with salt, and I put fresh fruits of *mates*, bamboo shoots, *bi cheng*, and put salted water in a bottle. I can use it 4 days later, and it keeps 1 year” (Fig. 3F; it tasted salty and spicy and smelled of lactic acid; Kaoh Doun Teay, Trapeang Chour, Aoral, Kampong Speu, Suoy, male, age no data), “I boil water with salt, and I add fresh fruits of *maak phit*, sugar, garlic, *bi cheng*, and salted water in a bottle” (it tasted a little sweet and smelled of garlic; Samkhuoy, Samkhuoy, Sesan, Steung Treng, Lao, female, 55 years old), “I put fresh fruits of *marach*, salt, sugar, and *bi cheng* in a bottle” (Maemoum, Sokh Sant, Kaoh Nheaek, Mondolkiri, Phnong, female, 30 years old), and “I boil water with salt, and add fresh fruits of *marach* and sugar. I can use it after 3 to 5 days, it keeps for 1 year” (Khuon Thum, Kaoh Peak, Veun Sai, Ratanakiri, Krung, female, 54 years old).

[Soaked in liquid left over from boiling rice]: “I put fresh fruits of *marach*, salt, garlic, lemongrass, and leftover liquid from boiled rice in a bottle” (Fig. 3G; Srae Y, Romonea, Ou Reang, Mondolkiri, Phnong, female, 49 years old), “I put fruits of *bang*, salt, garlic, *bi cheng*, and leftover liquid from boiled rice in a bottle” (Kong Nok, Veun Sai, Veun Sai, Ratanakiri, Jarai, male, 44 years old), “I put only fresh fruits of *marach* and leftover liquid from boiled rice in a bottle. It becomes sour after 2 to 3 days, and it can keep 1 to 2 months. If the fruits are finished, I add another fruits to the same bottle” (Pu Char, Srae Preah, Kaev Seima,

Mondolkiri, Phnong, female, around 50 years old), “I fry fruits of *marach* without oil, and put them in a bottle with salt, garlic, *bi cheng*, and leftover liquid from boiled rice” (Pon Chea, Ou Krieng, Sambour, Kracheh, Phnong, female, around 55 years old), and “I put some rice in water and boil it. I put it in a bottle with fresh fruits of *hang* and garlic. It becomes sour and smells good” (Leu Yuon, Ke Chong, Bar Kaev, Ratanakiri, Jarai, male, 60 years old).

Compared to Khmer or other ethnic groups, many Phnong said that they used liquid left over from boiling rice to soak fruits, possibly because of some unknown cultural reason.

6.3. Use of leaves and roots of *Capsicum* (Khmer and other ethnic groups)

All Khmer interviewees and 45 of 51 interviewees of other ethnic groups had eaten or knew how to eat leaves of *Capsicum* (mainly *C. frutescens*) as a vegetable (Table 7), but no one ate roots as a spice or vegetable in this survey. The Khmer ate leaves as a vegetable in soup, such as *samla korkow*, *samla tapeang*, *samla probaw*, and *samla masaw*, and in fried food: “I fry leaves of *mates* with beef” (Pnov, Pnov, Santuk, Kampong Thom, Khmer, male, 43 years old). When we surveyed *Capsicum* in Mondolkiri, we asked a Khmer lady in a small restaurant to use leaves of *C. frutescens* for our lunch, and she cooked the leaves with canned fish (tomato flavor) (Fig. 3H). People of other ethnic groups also used leaves for soup, e.g., *tapeang* or *korkow* in Khmer Khe and Suoy; *bach phubaa* in Kuy, *phrajyuuuk jyoropeh* (= *samla korkow*) in Brao; *choloong choropeh* (= *samla masaw*), and *choloong chala marach* (soup of chili leaves) in Krung; *kaiye choropeh* (= *samla masaw*) in Lun; *sad-boong* (*chodboong*) *tae* (*taï*) (= *samla masaw*) in Tampuan; *trraw marach* (= soup of chili, including fruits and leaves) in Phnong, *lang deh* in Kachok, *nyam ot* (= *samla probaw*) in Jarai, and *keeng kbao kbua* (= *samla korkow*) in Lao. They also fried leaves: “I fry leaves of *bblech* with other vegetables. We call the food *kadaak*” (Paiyang, Ta Veang, Ta Veang, Ratanakiri, Brao, male, 50 years old) and “I use leaves of *marech* (in Lun, *nglaang* in Kachok) as a fried vegetable” (Tha Ngaich, Ta Veang, Ta Veang, Ratanakiri, Lun, male, 35 years old; Kaoh Peak, Kaoh Peak, Veun Sai, Ratanakiri, Kachok, male, 38 years old). However, some people did not eat leaves of *Capsicum*: “I do not eat leaves of *marech*. Only other ethnic groups eat them” (Chan, Ta Veang Leu, Ta Veang, Ratanakiri, Krung, male, 60 years).

People in Southeast and East Asia eat leaves of *Capsicum*, mainly *C. frutescens*, as do people in Cambodia. For example, indigenous peoples of Taiwan used to add *C. frutescens* leaves to gruel made of foxtail millet (*Setaria italica*) or maize (*Zea mays*), or to soup as a vegetable. People in the Batanes Islands, Philippines, often use *C. frutescens* leaves as a vegetable and put leaves into a fish soup called *nilaneg amung* and a chicken soup called *tinola*.⁷ In Japan, some people boil down leaves of *C. annuum* in soy.

People in Cambodia collected leaves of *Capsicum* mainly from their home gardens or fields or obtain them from other villagers (Table 7). Some people also bought leaves at market, but use of leaves of *Capsicum* seemed to be more self-sufficient. People tended to eat leaves of *Capsicum* more in the rainy season than in the dry season because it is easy to collect them: “I can eat leaves of *hang* once every 4 to 5 days,

⁷ Yamamoto and Nawata 2009a.

but I cannot eat them in the dry season” (Leu Yuon, Ke Chong, Bar Kaev, Ratanakiri, Jarai, male, 60 years old) and “I often eat leaves of *marach* because I like them. I cultivate plants by watering in the dry season” (Pu Char, Srae Preah, Kaev Seima, Mondolkiri, Phnong, female, around 50 years old).

Some Khmer also used leaves of *Capsicum* for coloring cakes: “I grind sticky rice with leaves of *mates* using a stone mortar for coloring the rice green” (Phdleik, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, female, 40 years old; Tuol Kreul, Tuol Kreul, Prasat Balangk, Kampong Thom, Khmer, female, age no data).

6.4. Medicinal uses of *Capsicum*

6.4.1. Khmer

The Khmer used fruits, leaves, and roots of *Capsicum* as traditional medicines for “digestion, stomachache, diarrhea, and vomiting,” “headache, arthralgia, and bruises,” “snakebite, dog bite, or wood wounds,” “itching or insect bites,” “childbirth,” “*pub* (venom, poison),” “*spuk* (numb, sluggish),” “*sraeng* (kind of skin disease, ringworm),” “malaria,” and so on, and for animal diseases (Table 8).

[Fruits or roots for digestion, stomachache, diarrhea, and vomit]: “Fruits of *mates* promote your digestion when you eat hard fruits, for example *traabae* (guava), with them” (Kansaom Ak, Samraong, Samraong, Takaev, Khmer, male, 35 years), “When you have diarrhea, you should mix fruits of *mates*, *marech* (pepper, *Piper nigrum*), *mrang phluung* (soot), honey, and *sraa sor* (rice liquor) and drink it. A *kruu khmer* (traditional doctor) taught me so” (Kbal Teahean, Chheu Tom, Krakor, Pursat, Khmer, female, 33 years old), “When you have diarrhea or vomiting, you should squash fresh fruits of *mates* and add to *sraa sor*, and drink the filtered liquid” (Khmar Totueng, Khmar Totueng, Bakan, Pursat, Khmer, male, 60 years old), “When you have trouble in your stomach, you should squash fresh fruits of *mates* and paint them on diseased parts. A *kruu khmer* taught me so” (Peam, Doun Kaev, Puok, Siem Reap, Khmer, male, 37 years old), and “When you have a stomachache, you should make a decoction of roots of *mates* and other plants and drink it” (Khmar Totueng, Khmar Totueng, Bakan, Pursat, Khmer, male, 60 years old; Pnov, Pnov, Santuk, Kampong Thom, Khmer, male, 43 years old).

[Fruits for headache, arthralgia, and bruises]: “When you have a headache, you should paint squashed fresh fruits of *mates* on your brow, but you have to prevent the juice of *mates* from dripping into your eyes” (Ou, Krang Chek, Oudong, Kampong Speu, Khmer, male, 63 years old), “A *kruu khmer* used fruits of *mates* and other plants as a medicine for people who had arthralgia” (Toap Tbaeng, Banteay Preal, Rolea B’ier, Kampong Chhnang, Khmer, male, 40 years old; Thmei, Sna Ansa, Krakor, Pursat, Khmer, male, 60 years old), and “When you have *choam* (a bruise), you should mix fresh fruits of *mates*, *rumdeng srok* (*Alpinia* sp.), *rumdeng prey* (*Alpinia* sp.), and *khnbai* (ginger, *Zingiber officinale*) and put it on the diseased part” (Ruessei Lok, Ruessei Lok, Chikraeng, Siem Reap, Khmer, male, 33 years old).

[Fruits or roots for wounds by snakes, dogs, wood, etc.]: “When I was bitten by a snake, elder people told me to put fresh fruits of *mates* to neutralize poison” (Kilo38, Traeng, Rotonak Mondol, Battambang, Khmer, male, age no data, moved from Kampong Cham in 1998), “When you are bitten by a dog, you

should put a mixture of fresh fruits of *mates* and salt on the diseased parts” (Chheh Chan, Svay Leu, Svay Leu, Siem Reap, Khmer, female, 41 years old; Pnov, Pnov, Santuk, Kampong Thom, Khmer, male, 43 years old), and “I put roots of *mates* and other plants into water, and I painted the liquid on the diseased parts, such as wounds by bees, snakes, or wood. My parents told me so” (Ou Svay, Ou Svay, Thala Barivat, Steung Treng, Khmer, male, 60 years old, moved from Kandal in 1966). Traditional Japanese and Chinese herbalism books state that *Capsicum* can cure snakebites, and indigenous peoples in Taiwan used *Capsicum* in the same way as in olden days.⁸

[Fruits or leaves for itching (ringworm, etc.) or insect bites]: “My friend had ringworm, and he painted fresh fruits of *mates* on his body. His skin was getting better soon” (Snay, Ta Ches, Kampong Tralach, Kampong Chhnang, Khmer, male, 50 years old), “Four to five years ago, I mixed fresh fruits of *mates* and salt and put it on itching parts” (Kansaom Ak, Samraong, Samraong, Takaev, Khmer, male, 35), “When you are bitten by *sat luat* (insect), you should put fresh fruits on the part, then the wound will get better soon” (Toap Tbaeng, Banteay Preal, Rolea B’ier, Kampong Chhnang, Khmer, male, 40 years old), and “When I was bitten by a centipede, a *kruu khmer* chewed leaves of *mates* and put it on my diseased part” (Ballang Kraom, Rung Chrey, Thma Koul, Battambang, Khmer, male, 62 years old).

[Fruits or roots for childbirth]: “When I delivered a baby, a *kruu khmer* mixed fresh fruits of *mates*, *marech*, *kbtum* (garlic), and *sraa sor* and I drank the filtered liquid for 1 week to promote blood excretion” (Spean Thmei, Leang Dai, Angkor Thum, Siem Reap, Khmer, female, 45 years old), “A woman, who delivered a baby, drank a special medicine; *mates*, *marech*, *kbtum*, *dey pley* (*Piper retrofractum*), *kbnyei tek*, *kbnyei phluung*, *rumdeng srok*, and *rumdeng prey* soaked in *sraa sor*. She should drink a small glass of this medicine for 1 month” (Samrong, Khnar Pou, Soutr Nikom, Siem Reap, Khmer, male, 43 years old; Bos Thom, Khnar Pou, Soutr Nikom, Siem Reap, Khmer, female, 60 years old), “My sister drank a special medicine three times a day after childbirth; she put seven pieces of root and stem of *mates*, tied together, and one nail into water, and boiled it” (Doung, Doung, Prasat Balangk, Kampong Thom, Khmer, female, 55 years old), and “A *kruu khmer* told me to collect roots of *mates* as a medicine for a lady who delivered a baby because women become enfeebled and get sick easily after childbirth” (Anhchanh Rung, Anhchanh Rung, Baribour, Kampong Chhnang, Khmer, male, 62 years old). Indigenous people in Taiwan also use fruits and roots of *Capsicum* to promote blood excretion,⁹ and some people in Indonesia use squeezed juice from leaves of *Capsicum* for promoting childbirth.¹⁰

[Fruits or roots for *pub*]: “You have to squash seven fresh fruits of *mates* and add a spoonful of water. Lick sugar, drink the mixture of *mates* and water, and then lick the sugar again. Your *pub* will get better” (Trapeang, Rovieng, Samraong, Takaev, Khmer, male, 45 years old), “When my finger was swollen and hot because of *pub*, I mixed fresh fruits of *mates* and salt and put it on my finger” (Anlong Meas, Prey Lvea,

⁸ Yamamoto 2009.

⁹ Yamamoto and Nawata 2009a.

¹⁰ Naj 1992.

Prey Kabbas, Takaev, Khmer, male, 49 years old), “When I had a *pub* on my finger, I painted a mixture of *mates*, *prabok* (fermented fish), and “filth of *chrugn*” (external layer of thin filth on a used chopping board) on my finger and covered by clothes” (Peani, Peani, Kampong Tralach, Kampong Chhnang, Khmer, male, 50 years old), “When I had a *pub*, I drank a small cup of a special medicine twice a day of fresh fruits of *mates*, *kombaw* (lime, mineral), dried leaves of tobacco, *kronyuung*, and juice of *kreoch chmaa* (lime, a citrus plant)” (Phdleak, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, female, 40 years old), “A *kruu khmer* told me that you should paint a mixture of roots of *mates*, roots of *kreoch chmaa*, and burnt rice on a diseased part when you have a *pul*” (Kranhung, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, male, 37 years old), and “When you have a *pub*, you should mix *mates* and other plants and put on the diseased part because hotness of *mates* can oppose and beat the hotness of *pul*” (Ballang Kraom, Rung Chrey, Thma Koul, Battambang, Khmer, male, 62 years old).

[Fruits or roots for *spuk*]: “When I had a *spuk* on my foot and I could not move it, a *kruu khmer* painted a mixture of *mates*, *marech*, *kebtum*, *rumdeng*, *smau seb*, and *sraa sor* on my diseased part” (Bat, Doun Peaeng, Angkor Chum, Siem Reap, Khmer, female, 37 years), “A *kruu khmer* squashed fresh fruits of *mates* and painted them on my whole body except above the neck for a *spuk*” (Spean Thmei, Leang Dai, Angkor Thum, Siem Reap, Khmer, female, 45 years old), “When you have a *spuk*, you should mix fresh fruits of *mates* and other plants, and put them on diseased parts and wrap with cloths. The hotness of the medicine can cure the *spuk*” (Kouk Dong, Krabei Riel, Puok, Siem Reap, Khmer, female, 46 years old; Kab Dai, Prasat, Varin, Siem Reap, Khmer, female, 54 years old), and “When you have a *spuk*, you should wrap roots of *mates* and other plants in a cloth and put it in boiling water. You pick it up and put the cloth including the mixture, which is still warm, on the diseased parts” (Samrong, Khnar Pou, Soutr Nikom, Siem Reap, Khmer, male, 43 years old).

[Leaves for *sraeng*]: “When you have a *sraeng*, you should pound leaves of *mates* and paint them on the diseased parts” (Thmei, Sna Ansa, Krakor, Pursat, Khmer, male, 60 years old) and “When I had a *sraeng*, I rubbed leaves against the diseased part for 4 to 5 days. Old people taught me, and the skin got better soon” (Kraom, Preah Rumkel, Thala Barivat, Steung Treng, Khmer, female, 31 years old; Hang Khou Ban, Sameakki, Sameakki, Steung Treng, Khmer, male, 52 years old, moved from Preah Vihear in 1962).

[Fruits, leaves, stems, or roots for malaria]: “When you catch malaria, you should mix fruits of *mates* (a number equivalent to your age, that is, if I am 29 years old, I should use 29 fruits of *mates*), seven fruits of *marech*, seven pieces of *kebtum*, palm sugar, juice of a few fruits of *kreoch chmaa*, and water, and drink the liquid many times” (Samrong, Khnar Pou, Soutr Nikom, Siem Reap, Khmer, male, 43 years old), “When I had a high fever, a *kruu khmer* boiled roots of *mates* and other plants and made me drink it” (Kouk Trach, Khnat, Puok, Siem Reap, Khmer, male, 46 years old), and “When you feel a chill, you should pound and boil leaves of *mates* and drink it” (Taprey, Pongro, Baray, Kampong Thom, Khmer, male, 38 years old). Fruits of *Capsicum* were also used as preventive medicine (the following stories could be related to popular beliefs): “You will not get malaria if you eat lots of fruits of *mates* before going to a forest” (Pnov, Pnov, Santuk, Kampong Thom, Khmer, male, 43 years old), “You will not catch malaria if you eat many fruits

of *mates* because the hotness of *mates* in your body can protect you against malaria” (Mkak, Snam Krapeu, Kong Pisei, Kampong Speu, Khmer, male, 42 years old), and “When someone goes to a mountain or a forest, he will not catch malaria if he breathes smoke made by putting fresh or dried fruits of *mates* and other plants in the fire” (Kab Dai, Prasat, Varin, Siem Reap, Khmer, female, 54 years old). Traditional doctors in the Malay Peninsula used *Capsicum* for malaria.¹¹

[Fruits for animal diseases]: Fruits of *Capsicum* were also used to treat livestock (Table 8). When a chicken has eye disease, or when chickens fight one another and become wounded, people put the juice of fresh fruits of *mates*, sometimes with salt, on the diseased parts. People also feed fresh fruits of *mates* to sick chickens or ducks, sometimes with salt, garlic, and palm sugar. “When cattle have gas on the stomach, I pound and mix seven fruits of *mates*, seven fruits of *marech*, and a small glass of fish sauce for a calf, or 21 fruits of *mates*, 21 fruits of *marech*, and a big glass of fish sauce for cattle. I pour this medicine into their mouth with a bamboo container. My parents taught me how to do it” (Kranhung, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, male, 37 years old).

6.4.2. Other ethnic groups

Although in fewer numbers than the Khmer, members of other ethnic groups also used fruits, leaves, and roots of *Capsicum* as traditional medicines for stomachache or diarrhea, wounds, eye disease, insect bites, childbirth, *pub*, *sraeng*, malaria, and so on, and for animal diseases (Table 8).

[Fruits, leaves, stems, or roots for stomachache or diarrhea]: “When I had stomach troubles, I pounded one to three fruits of *maak phit* and other plants, and I exposed the mixture to moonlight. Later, I boiled the mixture and drank it” (Veun Sai, Veun Sai, Veun Sai, Ratanakiri, Lao, male, 55 years old), “When I had stomach troubles, I pounded roots and leaves of *marech* and boiled them with other plants. I drank it” (Nang Hai, Seda, Lumphat, Ratanakiri, Tampuan, female, 80 years old), and “When I had stomach troubles, I boiled roots and stems of *marach* and other plants, and I drank it” (Maemoum, Sokh Sant, Kaoh Nheak, Mondolkiri, Phnong, female, 30 years old).

[Fruits for wounds]: “When you go to forests or paddy fields and you get hurt on your foot, you should mix fresh fruits of *maak phit* and water and put them on your diseased part” (Anlong Svay, Preah Rumkel, Thala Barivat, Steung Treng, Lao, male, 78 years old), “When you use a knife and you get hurt on your fingers, you should boil fresh fruits of *marach* and put it on your fingers” (Malik, Malik, Andoung Meah, Ratanakiri, Tampuan, male, 28 years old), and “When you have suppuration on your foot, you should pound fresh fruits of *marech* with salt and put it on your foot” (Chuoy, Ta Veang Leu, Ta Veang, Ratanakiri, Krung, male, 40 years old).

[Fruits for eye disease]: “When you have an eye disease, you should put a fresh red fruit of *maak phit* on your eye” (Samkhuoy, Samkhuoy, Sesan, Steung Treng, Lao, female, 55 years old), “When you have a problem on your eye, you should put juice of fresh fruits of *hang* into your eye. My parents taught me how

¹¹ Naj 1992.

to do it because we did not have modern medicine in old times” (Pralai, Lum Choar, Ou Ya Dav, Ratanakiri, Jarai, male, around 50 years old), and “When you have an eye disease, you should squash fresh fruits of *marach* and put it on your eye” (Pa Tat, Seda, Lumphat, Ratanakiri, Tampuan, female, 29 years old).

[Fruits for insect bites]: “When you are bitten by *kehduoy* (a scorpion), you should put fresh fruits of *marech* on the bitten part” (Khuon Thum, Kaoh Peak, Veun Sai, Ratanakiri, Krung, female, 54 years old).

[Roots for childbirth]: “A woman, who does not have a baby, boils roots of *marech* and other plants, and drinks it” (Katout, Kamphum, Sesan, Steung Treng, Brao, male, 58 years old) and “A woman, who delivered a baby, boiled roots of *marech* and other plants and drank it to make her body warm” (Khuon Thum, Kaoh Peak, Veun Sai, Ratanakiri, Krung, female, 54 years old).

[Roots for *pub*]: “When you have a *pub*, you should boil roots of *bhlech* and put it on the diseased part” (Paiyang, Ta Veang, Ta Veang, Ratanakiri, Brao, male, 50 years old).

[Fruits and leaves for *sraeng*]: “When you have a *sraeng*, you should squash fresh fruits of *maak phit* and put on the diseased parts directly” (Siem Pang, Sekong, Siem Pang, Steung Treng, Lao, female, 30 years old) and “When you have a *srueng*, you should mix leaves of *maak phit*, leaves of tobacco, and lime (mineral) and put it on the diseased parts” (Kamphum, Kamphum, Sesan, Steung Treng, Lao, male, 66 years old).

[Fruits, roots, or whole plants for malaria]: “When you have malaria, you should boil a whole plant of *maak phit* and drink it” (Siem Pang, Sekong, Siem Pang, Steung Treng, Lao, female, 30 years old), “If you eat fruits of *marech* before going to a forest, you will not get malaria” (L’ak, Loak, Ou Chum, Ratanakiri, Krung, female, 60 years old) and “When I had a fever, I boiled roots of *maak phit* and other plants and drank it. My parents taught me how to do it” (Veun Sai, Veun Sai, Veun Sai, Ratanakiri, Lao, male, 55 years old).

[Fruits for animal diseases]: People usually put fresh fruits of *Capsicum* on chicken eyes. “When a chicken has an eye disease, I chew fresh fruits of *hang* and salt and blow them on the eye. I can use this remedy for eye disease of water buffalo” (Lam, Pak Nhai, Ou Ya Dav, Ratanakiri, Jarai, male, around 50 years old) and “When a water buffalo goes to a forest and he gets hurt on his body, I wash the diseased part, mix fresh fruits of *marach* and salt, and put it on the part” (Kong Rae, Sokh Sant, Kaoh Nheak, Mondolkiri, Phnong, female, around 45 years old).

People in Cambodia used *Capsicum* to treat diarrhea, pains, wounds, *pub*, *spuke*, and so on, mainly due to the hotness (*kedao*). They may have discovered these uses based on traditional botanical knowledge, but scientific studies have also demonstrated that certain extracts and essential oils of *Capsicum* have negative effects on the growth of some bacteria.¹² Moreover, capsaicin, a pungent ingredient of hot peppers, can produce long-lasting suppression of sensory neuron activity, and this compound is used to relieve pain caused by arthritis and pruritus.¹³ These medicinal uses are also known in Southeast and East Asia, but the Khmer tended to know more medicinal uses for *Capsicum* than other ethnic groups, possibly because of traditional doctors, *kruu khmer*. Some Khmer mentioned the number 7, e.g., “seven” fruits of *mates* or “seven” pieces

¹² Abdou *et al.* 1972; Galli *et al.* 1985

¹³ Craft and Porreca 1992.

of roots and stems of *mates*, when talking about remedies related to *Capsicum*, indicating that the number 7 seems to be related to a Buddhist idea or an idea from old India (a base-7 numeral system).

6.5. Ritual uses of *Capsicum*

6.5.1. Khmer

Mainly fruits of *Capsicum*, but sometimes flowers and young leaf buds, were used to exorcise evil spirits, such as *khmoc*, *neak taa*, *priei*, and *aap*, from people by traditional Khmer doctors (*kruu khmer*) (Table 9). There were several ways of using *Capsicum*: putting or placing, wrapping or binding, blowing or throwing, breathing smoke, and drinking. People thought that the reason why *kruu khmer* used *Capsicum* was because of the hotness (*kdao*); therefore, *kruu khmer* also used other hot or spicy plants, such as *marech* (pepper), *rumdeng* (*Alpinia* spp.), and *khnyei* (ginger). Some people thought that evil spirits came out of someone's body because of the hotness. The Khmer also had some cases related to childbirth and taboos.

[Putting or placing]: “A *kruu khmer* mixed fresh fruits of *mates*, *sacchun* (alum), and urine, and put it on eyes, nostrils, and earholes of someone who was possessed by *khmoc*” (Preah Ponlea, Rung Chrey, Thma Koul, Battambang, Khmer, male, 37 years old), “There are many kinds of spirits in a mountain. You will not be possessed by an evil spirit on mountain if you eat many fruits of *mates* before going there. If someone is possessed by an evil spirit, a *kruu khmer* squashes fresh fruits of *mates*, which should be very hot, and paints them on his face” (Ou, Krang Chek, Oudong, Kampong Speu, Khmer, male, 63 years old), “A *kruu khmer* mixed and pounded *mates* and other plants, and put the mixture on the belly of a person who was possessed by *khmoc*” (Tuol Kreul, Tuol Kreul, Prasat Balangk, Kampong Thom, Khmer, female, age no data), and “A *kruu khmer* pounded dried fruits of *mates* and other plants and painted them on the upper half of the body of a person who was possessed by an evil spirit. The evil came out from his body because of the hotness” (Ou Svay, Ou Svay, Thala Barivat, Steung Treng, Khmer, male, 60 years old, moved from Kandal in 1966).

[Wrapping or binding]: “A *kruu khmer* mixed fresh fruits of *mates*, *khnyei*, *rumdeng srok*, and *rumdeng prey*. He put the mixture on painful parts of a person who was possessed by *khmoc* and wrapped them in cloths” (Ruessei Lok, Ruessei Lok, Chikraeng, Siem Reap, Khmer, male, 33 years old), “A *kruu khmer* pounded flowers and young leaf buds of *mates* with other plants. He put the medicine on diseased parts of a person who was possessed by *khmoc* and wrapped them in a cloth to make the parts hot and to make the bad spirit come out” (Khvit Tuol Khleang, Kbal Tuek, Tuek Phos, Kampong Chhnang, Khmer, female, 51 years old), “A *kruu khmer* pounded fruits of *mates* and other plants, put them on wrists, ankles, and belly, and wrapped them in a cloth to exorcise evil spirits” (Kampang, Svay Dounkaev, Bakan, Pursat, Khmer, male, 42 years old; Kouk Kruos, Varin, Varin, Siem Reap, Khmer, female, 32 years old), and “First I had a stomachache, and soon I felt pain on my whole body. I visited a *kruu khmer* and he pounded fresh fruits of *mates* and *marech*, added a little water, put them on my belly, and wrapped me in a cloth. I got better soon” (Nipech, Nipech, Kampong Svay, Kampong Thom, Khmer, female, 29 years old).

[Blowing or throwing]: “A *kruu khmer* chewed fruits of *mates* and *rumdeng*, and blew them on the whole

body of someone who was possessed by *khmoc*” (Chheh Chan, Svay Leu, Svay Leu, Siem Reap, Khmer, female, 41 years old), “A *kruu khmer* chewed fresh fruits of *mates* and blew them on the whole body (sometimes face) of someone who was possessed by *khmoc*” (Trapeang Thmor Thmay, Sala Visai, Prasat Balangk, Kampong Thom, Khmer, male, 33 years old; Phdlek, Phan Nheum, Prasat Balangk, Kampong Thom, Khmer, female, 40 years old), “A *kruu khmer* pounded dried fruits of *mates*, and he threw the powder into the face with open eyes of someone possessed by *khmoc*. I have seen a *kruu khmer* put fresh fruits of *mates* with water on eyes of patients” (Antit Sokh, Kouk Doung, Angkor Chum, Siem Reap, Khmer, male, 36 years old), and “A *kruu khmer* pounded dried fruits of *mates* and blew the powder through a stem of *lhong* (papaya, *Carica papaya*, its stem is hollow) into the face of a person possessed by *khmoc*. Of course, the patient had to open their eyes” (Thma Koul, Chhnuor Meanchey, Preah Netr Preah, Banteay Meanchey, Khmer, male, 47 years old).

[Breathing smoke]: “A *kruu khmer* blew smoke of fruits of *mates* using a bamboo onto the face, especially eyes and nose, of someone who was possessed by *khmoc*” (Ruessei, Rohal, Preah Netr Preah, Banteay Meanchey, Khmer, male, 55 years old) and “A *kruu khmer* put dried fruits of *mates* and other plants in the fire, and made someone possessed by *khmoc* breath the smoke. The hotness made the bad spirit come out” (Srae Nouy, Srae Nouy, Varin, Siem Reap, Khmer, male, 35 years old; Ou Svay, Ou Svay, Thala Barivat, Steung Treng, Khmer, male, 60 years old, moved from Kandal in 1966)

[Drinking]: “A *kruu khmer* pounded *mates* and other plants, and made someone who was possessed by *khmoc* drink the liquid” (Tuol Prum Muoy, Kakaoh, Moung Ruessei, Battambang, Khmer, female, 39 years old).

[Childbirth]: “If a woman has a stillborn baby, we think that *priei chongkraan* (a kind of evil spirit) is coming to her. When my daughter had a stillborn baby, a *kruu khmer* mixed *mates*, *rumdeng*, and *sraa sor* and he put the liquid on her whole body to protect her from *priei chongkraan*” (Anhchanh Rung, Anhchanh Rung, Baribour, Kampong Chhnang, Khmer, male, 62 years old).

[A kind of taboo]: “If you eat too many fruits of *mates*, your eyesight will become poor” (Kleng Prak, Ph’er, Kampong Chhnang, Kampong Chhnang, Khmer, female, 58 years old), “Your eyesight will become poor if you eat many fruits of *mates*, except fruits of *mates chmar*” (Kampang, Svay Dounkaev, Bakan, Pursat, Khmer, male, 42 years old), and “You should not eat *mates* when your health is not good” (Peani, Peani, Kampong Tralach, Kampong Chhnang, Khmer, male, 50 years old). Related to pregnancy: “A pregnant woman does not eat spicy food” (Chheu Teal Phluoh, Prey Ampok, Kiri Vong, Takaev, Khmer, male, 28 years old).

Indigenous peoples of Taiwan and the Batanes Islands also said that the consumption of too many fruits of *Capsicum*, except *C. frutescens*, would cause poor eyesight, which may be related to a concept of Han Chinese traditional medicine. An old Japanese herbalism book (Kaibara 1709) that was introduced from China stated that eating too many *Capsicum* fruits causes poor eyesight. However, it was also reported that people in the seventeenth century in Spain ate two roasted fruits of *Capsicum* after every meal to improve poor eyesight.¹⁴

¹⁴ Naj 1992.

6.5.2. Other ethnic groups

Fruits of *Capsicum* were used for exorcising evil spirits by Lao and as offerings by Phnong and Jarai: “Fruits of *maak phit* were put into the fire, and a person possessed by evil spirits breathed the smoke” (Na Oung, Srae Sambour, Siem Pang, Steung Treng, Lao, male, 72 years old), which was very similar to the remedy of *kruu khmer*. It is not known whether this usage was introduced from the Khmer or is a traditional way of the Lao; therefore, it is necessary to study ritual usage of *Capsicum* in Laos. “When a family member has a problem, such as sickness, we put *marach*, fruits of egg plant, banana, and rice in a rice flat basket in the yard” (Kong Rae, Sokh Sant, Kaoh Nheak, Mondolkiri, Phnong, female, around 45 years old) and “When a family member has a problem, such as a death, we use fruits of *hang* as an offering” (Ten Ngol, Ya Tung, Ou Ya Dav, Ratanakiri, Jarai, female, around 50 years old). There are reports¹⁵ that Ami (one group of indigenous people in Taiwan) shamans in some areas eat only *Capsicum* for a few days during their training period because *Capsicum* has spiritual powers.

Fruits of *Capsicum* were also used for agricultural rituals. “Before planting rice, we put steamed chicken, rice, *maak phit*, and other plants near by a big tree” (Veun Sai, Veun Sai, Veun Sai, Ratanakiri, Lao, male, 55 years old), “Before planting crops, we offer stems of rice, stems of maize, stems of vegetables, and stems of *marach* around the field for a bumper harvest” (Pu Hoam, Dak Dam, Ou Reang, Mondolkiri, Phnong, female, 35 years old), “Before planting rice, we tie four to five red fruits of *marach* on the tip of a bamboo pole or a stick (wood), and we put it in the ground of the field for a bumper harvest” (Pu Tru, Saen Monourom, Ou Reang, Mondolkiri, Phnong, female, around 45 years old), and “Before planting rice, we offer chicken and rice, and also tie a few fruits of *marach* on the tip of a stick (wood), and we put it in the ground of the field” (Tram Kach, Krang The, Pechrada, Mondolkiri, Phnong, female, around 50 years old). A ritual structure of *Capsicum* was observed in a Phnong village (Pechrada, Mondolkiri; Fig. 3I). The Karen in northern Thailand and Jinuo in Yunnan in China use *Capsicum* as offerings for agricultural rituals, and some indigenous peoples in Taiwan have taboos that they cannot eat or even touch *Capsicum* during an agricultural ritual.¹⁶

There were taboos for *Capsicum* among minority groups. “We could not bring *marech nyagn* (a small fruit type of *C. frutescens*) into or around the house. Other *marech* was O.K., but only *marech nyagn*. In olden days, we could not eat and touch *marech nyagn*. If you bring it into the house, chickens or other animals would become sick or die. If animals did not, then people would become sick. If *marech nyagn* grew wild in home garden, we had to ask someone who was not a family member of the house to cut the plant” (Kong Nok, Veun Sai, Veun Sai, Ratanakiri, Kravet, female, 76 years old), “When you have someone who is sick in your family, you cannot bring *marech* into your house. My parents taught me. In olden days, every household did it, but now few households do” (Maemoum, Sokh Sant, Kaoh Nheak, Mondolkiri, Phnong, female, 30 years old), and “If fruits of *maak phit* were put in front of the door of someone’s hut in paddy fields, no one can get into the hut except family members. Fruits of *maak phit* can protect the hut from *phii thaai*-

¹⁵ Rinji Taiwan kyuukan chousakai 1914.

¹⁶ Yamamoto 2009.

boong (spirits of someone who died in an accident)” (Anlong Svay, Preah Rumkel, Thala Barivat, Steung Treng, Lao, male, 78 years old). It was reported that a Bunun (a group of indigenous people in Taiwan) woman talked about a superstition based on the idea that some people were allowed and others were not allowed to touch *Capsicum* because the plants would die if touched by people who were not allowed to touch them.¹⁷

6.6. Other uses of *Capsicum* (Khmer and other ethnic groups)

Fruits of *Capsicum* were used as material to produce rice malt (*me dombae* in Khmer; *bub* or *pub* in Brao, Krung, Kravet, Lun, and Tampuan; (*d*)rry in Phnong; *praa* in Kachok; *pooy* in Jarai; and *peeng* in Lao), which can brew rice alcohol. Some Phnong, however, did not use *Capsicum* for rice malt on purpose: “You will have diarrhea if you drink sake made with rice malt including *marach*” (Treab, Thmei, Kracheh, Kracheh, Phnong, female, around 50 years old; Pu Tru, Saen Monourom, Ou Reang, Mondolkiri, Phnong, female, around 45 years old).

People in Cambodia also used fruits of *Capsicum* for rituals when they produced rice malt or fermented rice. “I used to put fruits of *mates* and a few pieces of charcoal on and around mosquito nets that cover new *me dombae* for fermentation. I did it to protect new *me dombae* from *aap* (a kind of an evil spirit), but now I stopped because it is tiresome” (Rohat Tuek, Rohat Tuek, Mongkol Borei, Banteay Meanchey, Khmer, female, 52 years old), “An *aap* likes to drink the liquid of *tapae* (fermented rice), and *tapae* would go bad (unsuccessful fermentation) if the *aap* touches *tapae*. Thus, I used to put fruits of *mates* or thorny plants on the lid of a pot in which pieces of *tapae* were fermenting, to protect them from *aap*” (Thum, Srae Ronoung, Tram Kok, Takaev, Khmer, female, 64 years old), “Rice malt will be stronger if I put many dried fruits of *marech* on new rice malt and cover them with leaves or cloths” (Katout, Kamphum, Sesan, Steung Treng, Brao, male, 58 years old), “When I produce *bub* (rice malt), I put one fruit of *marech* for a big rice malt, or powder of *marech* for a small one, into a small hole made in the rice malt” (Fig. 3J; Khuon Thum, Kaoh Peak, Veun Sai, Ratanakiri, Krung, female, 54 years old), “I keep pieces of *bub* in a bamboo container with *bhlech* as an insect repellent” (Fig. 3K; Paiyang, Ta Veang, Ta Veang, Ratanakiri, Brao, male, 50 years old), and “In olden days, we kept *me dombae* in a bag with 10 dried fruits of *mates* and five pieces of charcoal as an insect repellent” (Thmei, Ta Kream, Banan, Battambang, Khmer, male, 46 years old).

These uses of *Capsicum*, such as as material to produce rice malt or in rituals to produce rice malt or fermented rice, are also known in Southeast and East Asia,¹⁸ but it is unknown whether and how these techniques originated in one place and were dispersed to other regions, or whether they originated in many places or cultures.

Fruits of *Capsicum* were used to prolong the period of drinking *tek tnaot chu* (palm wine). “Usually you can drink *tek tnaot chu* for 3 to 4 hours. But, I have even heard that you can drink *tek tnaot chu* for two more days if you put a fruit of *mates* into it” (Trapeang Snoul, Pechr Muni, Kong Pisei, Kampong Speu, Khmer,

¹⁷ Yamamoto and Nawata 2009a.

¹⁸ Yoshida 1993.

male, age no data), and “Relatives (from Siem Reap) of a villager came to our village, and I drank *tek tnaot chu* with them. He wanted to drink *tek tnaot chu* on the next day, thus, he put fruits of *mates* and juice of *krooch chmaa* into *tek tnaot chu*. The next morning, we could drink the special *tek tnaot chu*, but I had hotness in the buttock when I went to toilet...”(Toap Tbaeng, Banteay Preal, Rolea B’ier, Kampong Chhnang, Khmer, male, 40 years old).

Conclusion

In this study, *Capsicum* culture in Cambodia was studied in detail—linguistically, botanically, and ethnically. The results reveal that people in Cambodia use *Capsicum* in various ways, not only as a condiment but also as vegetable, as medicine, as colorant, in popular beliefs, in agricultural rituals, in taboos, and in rice malt. The Khmer may know more *Capsicum* remedies than other ethnic groups in Cambodia, or even indigenous peoples in Taiwan or the Batanes Islands, possibly because of the existence of *krum khmer*. These findings indicate that *Capsicum* is deeply incorporated into their culture, even though it did not originate in Cambodia and only about 400 years have passed since its introduction. Similarities and differences in *Capsicum* culture between Cambodia and other parts of Southeast Asia will be revealed by future studies in areas for which there is little information on detailed usage of *Capsicum*, such as Laos, Vietnam, Yunnan (China), and Myanmar.

We found no information on the following uses of *Capsicum*. Poison: It has been reported that Ainu in Japan, Bunun in Taiwan, and some Pygmy in Africa use, or used, *Capsicum* for arrow poison and that Tsou in Taiwan used *Capsicum* as fish poison.¹⁹ Punishment: Some people in the Batanes Islands, Philippines, said, “If somebody’s wife has an affair with another man, he will put squashed *C. frutescens* fruits on her genital area as punishment.” This story is very similar to a story from the Maya, who rubbed fresh *Capsicum* fruits on the genital areas of unfaithful wives.²⁰ In the past, mothers in the indigenous cultures of Taiwan and the Batanes Islands put squashed fresh fruits on their nipples to wean children. We would be very glad to receive any information from readers on uses of *Capsicum* in Cambodia.

¹⁹ Yamamoto 2009.

²⁰ Naj 1992.

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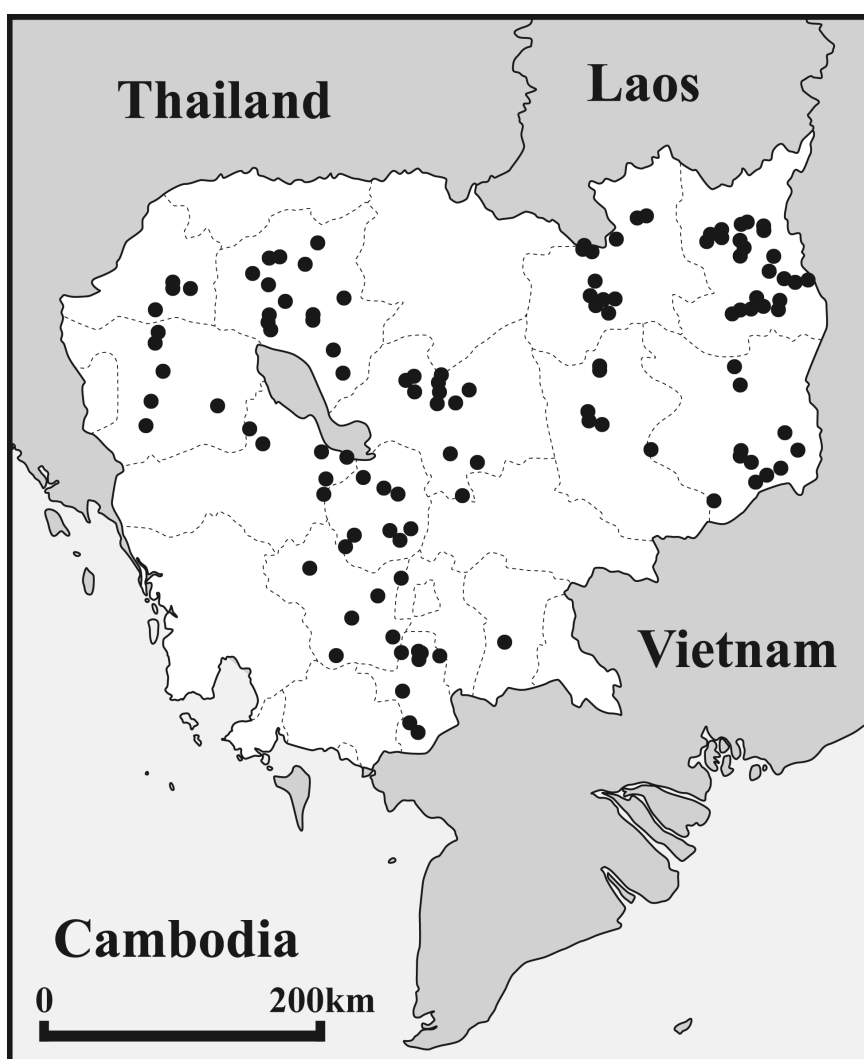


Fig. 1. Study sites (●) in Cambodia.



Fig. 2. Taxonomy of *Capsicum* in Cambodia and fruits and leaves sold in markets. Flower (A-1) and plant (A-2) of *C. annuum* (white flower, usually 5–7 petals). Flower (B-1) and fruit (B-2) of *C. annuum* (purple flower, *mates leak*). Flower (C-1) and fruit (C-2) of *C. frutescens* (greenish yellow flower), and a *mates khmar* plant with a little girl in Nipech, Nipech, Kampong Svay, Kampong Thom (C-3). Three kinds of *Capsicum* sold in Kiri Vong market, Takaev (left: *mates dai neang*, central: *mates ach sat*, and in her hands: *mates kuyteav*). *C. frutescens* sold in Pursat market: immature fruit color: green (right) and greenish yellow (left) (E). Decorative fruits of *mates dai neang* (F-1) and *mates kuyteav* (F-2) sold in Prey Lvea market, Takaev. Leaves of *C. frutescens* sold in Kampong Cham market (G-1 & G-2) and in Kampong Speu market (G-3).



Fig. 3. Use of *Capsicum* in Cambodia. A Khmer boy said, “I feed one fruit of *mates sor* per day to make the *sarikakeo* (minah) learn how to speak quickly” in Takaev (A-1) and *sarikakeo* in a cage (eating a *mates* fruit) in Kampong Chhnang (A-2). Fruits of *mates* soaked in unboiled water with salt in Kampong Speu (Khmer; B). Fruits of *mates* soaked in boiled water with salt, *angkerong* (ants), and garlic in Takaev (Khmer; C). Fruits of *mates* soaked in boiled water with salt in Kampong Thom (Khmer; D). Fruits of *mates* soaked in *tek tnaot chu* (palm wine) with salt in Kampong Speu (Khmer; E). Fresh fruits of *mates* soaked in salted water with bamboo shoots and *bi cheng* in Kampong Speu (Suoy; F). Fresh fruits of *marach* soaked in hot water left over from boiling rice with salt, garlic, and lemongrass in Mondolkiri (Phnong; G). Leaves of *C. frutescens* cooked with canned fish in Mondolkiri (Khmer; H). A ritual structure of *Capsicum* in a Phnong village (Pechrada, Mondolkiri; I). A fruit of *marech* put into *buh* (rice malt) in Ratanakiri (Krung; J). Pieces of *buh* kept in a bamboo container with *bblech* as an insect repellent in Ratanakiri (Brao; K).

Table 1. Local names for *Capsicum* among the Khmer.

Local names for mainly <i>Capsicum annuum</i>	Local names for mainly <i>C. frutescens</i> (all pungent)
Pungent or ornamental	Immature fruit color: green
<i>mates chongkaom</i> (<i>chongkaom</i> : cluster)	<i>mates uch chaup</i> (<i>ach</i> : droppings, <i>chaup</i> : sparrow)
<i>mates thai</i> (<i>thai</i> : of Thailand) (= <i>chongkaom</i> type)	<i>mates uch chma</i> (<i>chma</i> : cat)
<i>mates chong'ol mek</i> (<i>chong'ol mek</i> : pointing toward the sky)	<i>mates uch kondao</i> (<i>kondao</i> : rat)
<i>mates dai neang</i> (<i>dai neang</i> : ring finger)	<i>mates uch sat</i> (<i>sat</i> : animal)
<i>mates chung moan</i> (<i>chung</i> : foot, <i>moan</i> : chicken) (= <i>dai neang</i> type)	<i>mates brang</i> ^{*1} (<i>brang</i> : French or Westerner)
<i>mates khnay moan</i> (<i>khnay moan</i> : spur of chicken) (= <i>dai neang</i> type)	<i>mates chmar</i> (<i>chmar</i> : thin, small)
<i>mates kruchok neang</i> (<i>kruchok</i> : nail, <i>neang</i> : young lady) (= <i>dai neang</i> type)	<i>mates chnas</i> (<i>chnas</i> : to be mean, troublesome)
<i>mates kuy</i> (<i>kuy</i> : Kuy ethnic group)	<i>mates klor chma</i> (<i>klor</i> : penis, <i>chma</i> : cat)
<i>mates laek</i> (<i>laek</i> : color)	<i>mates daam chmar</i> (thin stem) (= <i>mates klor chma</i>)
<i>mates toeur</i> (<i>toeur</i> : dwarf) (= <i>laek</i> type)	<i>mates kbmang</i> (<i>kbmang</i> : enemy)
<i>mates lep aw</i> (<i>lep aw</i> : button)	<i>mates kbmaw</i> (<i>kbmaw</i> : black)
<i>mates sraal</i> (<i>sraal</i> : light)	<i>mates keon preach</i> (<i>keon</i> : kid, <i>preach</i> : small)
<i>mates veeng</i> (<i>veeng</i> : long)	<i>mates keor may</i> (<i>keor</i> : cattle, <i>may</i> : one in figures)
<i>mates rumdul</i> (<i>rumdul</i> : plant name, <i>Mitrella mesnyi</i>)	<i>mates mareh, marib</i> (<i>mareh</i> : pepper, <i>Piper nigrum</i>)
Non-pungent	<i>mates nijaw</i> (<i>nijaw</i> : cat)
<i>mates phlaek</i>	<i>mates pret</i> (<i>pret</i> : wild)
<i>mates hanaii</i> (<i>hanaii</i> : Hawaii)	<i>mates srov</i> (<i>srov</i> : a grain of rice)
	Immature fruit color: greenish yellow
	<i>mates sor</i> (<i>sor</i> : white)
	<i>mates kelung</i> (<i>kelung</i> : skin disease, leprosy) (= <i>mates sor</i> type)
	<i>mates kanyaw</i> ^{*2} (<i>kanyaw</i> : noodles) (= <i>mates sor</i> type)

*1: *mates brang* means *dai neang* on rare occasions.*2: *mates kanyaw* means *dai neang* on rare occasions.

Table 2. Local names for *Capsicum* among minority groups in Cambodia.

Ethnic group	General name	Local name for mainly for <i>C. annuum</i>	Local name for mainly for <i>C. frutescens</i>
<u>Mon-Khmer</u>			
Khmer Khe	<i>mates</i>	– <i>praeveng</i> (<i>praeveng</i> : long)	– <i>sor</i> (<i>sor</i> : white)
Suoy	<i>mates</i>	– <i>dai neang</i> – <i>liow</i> (= <i>mates leak</i> type)	– <i>niyav</i> (<i>niyav</i> : cat) – <i>kor nuy</i> (<i>kor</i> : cattle, <i>nuy</i> : one in figures) – <i>mareb</i> (<i>mareb</i> : pepper, <i>Piper nigrum</i>)
Kuy	<i>bhlach</i> (Kampong Thom) <i>mareb</i> (Kracheh)	– <i>gabok neang</i> (= <i>mates knobok neang</i>) – <i>phloo</i> (= <i>mates phlaok</i> type) – <i>chong'ol mek</i> (pointing toward the sky) – <i>phlaok</i> – <i>chanav iel</i> (<i>chanav iel</i> : spur of chicken) – <i>trok</i> (= <i>mates phlaok</i> type)	– <i>brang</i> (<i>brang</i> : French or Westerner) – <i>bray</i> (<i>bray</i> : white) – <i>klong ngaw</i> (<i>klong</i> : droppings, <i>ngaw</i> : cat)
Brao	<i>bhlech</i> (Steung Treng) <i>mareb</i> (Ratanakin)	– <i>chanav iel</i> (<i>chanav iel</i> : spur of chicken) – <i>trok</i> (= <i>mates phlaok</i> type) – <i>chanav iel</i> – <i>phrook</i> (= <i>mates phlaok</i> type)	– <i>nyagu</i> (= small fruit type) – <i>chongarrong</i> (= medium fruit type) – <i>siam</i> (<i>siam</i> : Siamese)
Krung	<i>mareb</i>	– <i>chanav iel</i> (<i>chanav iel</i> : spur of chicken) (= long fruit type) – <i>trok</i> , <i>trook</i> (= <i>mates phlaok</i> type) – <i>trok teh</i> (= <i>mates phlaok</i> type) – <i>q(umian choo</i>	– <i>chiam</i> (<i>chiam</i> : small bird) (= small fruit type) – <i>oi</i> (= small fruit type) – <i>lamada</i> (<i>lamada</i> : ordinary) (= small and green fruit type) – <i>q(ajarrok</i> (= greenish yellow fruit type) – <i>khmer</i> (Khmer)
Kravet	<i>mareb</i>	– <i>chanal iel</i> (<i>chanal iel</i> : spur of chicken) – <i>etbook</i> (= <i>mates phlaok</i> type) – <i>zen</i> (<i>zen</i> : candle) – <i>chanav iel</i> (<i>chanav iel</i> : spur of chicken) (= long fruit type) – <i>trok</i>	– <i>nyagu</i> (= small fruit type) – <i>maat</i> (= medium fruit type)
Lun	<i>mareb</i>		– <i>nyagu</i> (= small fruit type) – <i>chongarrong</i> (= medium fruit type)

Table 2. Continued.

Ethnic group	General name	Local name for mainly for <i>C. annuum</i>	Local name for mainly for <i>C. frutescens</i>
Mon-Khmer			
Tampuan	<i>marub</i>	<ul style="list-style-type: none"> – <i>trrei iel</i> (<i>trrei iel</i>: spur of chichen) – <i>yuan</i> (<i>yuan</i>: Vietnamese) (= long fruit type) – <i>phoom</i>, <i>phook</i>, <i>phool</i> (= long fruit type or <i>mates phlaok</i> type) – <i>déh</i> – <i>gachool</i> (<i>gachool</i>: porcupine?) (= long fruit type) 	<ul style="list-style-type: none"> – <i>ach nuarr</i> (<i>ach</i>: droppings, <i>nuarr</i>: rat) (= small fruit type) – <i>chiam</i>, <i>chuam</i> (<i>chiam</i>: bird) – <i>baok</i>
Phnong	<i>marub</i> (Mondolkiri)	<ul style="list-style-type: none"> – <i>ngeraphow</i> (<i>ngeraphow</i>: water buffalo horn) (= big or long fruit type) – <i>joong</i>, <i>choong</i> (= long fruit type) – <i>toeur</i> (= <i>mates toeur</i> type) – <i>krub</i> (= <i>mates phlaok</i> type) – <i>yong</i> (<i>yong</i>: Vietnamese?) (= <i>mates phlaok</i> type) – <i>pruiprein</i> – <i>pok</i> 	<ul style="list-style-type: none"> – <i>chiam</i> (<i>chiam</i>: bird) (= small fruit type) – <i>katup ew</i> (<i>katup</i>: penis, <i>ew</i>: cat) (= small fruit type) – <i>kerb</i> (= small fruit type) – <i>chem</i>, <i>chom</i> (<i>chem</i>: bird) (= small fruit type) – <i>miyaw</i> (<i>miyaw</i>: cat) (= small fruit type) – <i>jarui</i> – <i>tamada</i> – <i>deing</i> – <i>nguang</i>, <i>ngluang</i> (<i>nguang</i>: white) (= greenish yellow fruit type) – <i>dhong</i> (= greenish yellow fruit type) – <i>leben</i> (= small fruit type) – <i>bukainib</i> – <i>thong</i> (= small fruit type)
Kachok	<i>marub</i> (Ratanakiri) <i>n(q)chuang</i>	<ul style="list-style-type: none"> – <i>yuan</i> (<i>yuan</i>: Vietnamese) (long fruit type) 	

Table 2. Continued.

Ethnic group	General name	Local name for mainly for <i>C. annuum</i>	Local name for mainly for <i>C. frutescens</i>
<u>Austronesian</u>			
Jarai	<i>hang</i>	<ul style="list-style-type: none"> – <i>gagn</i> (= <i>mates dai neung</i> type) – <i>klang</i> (= big fruit type) – <i>lang</i> (= long fruit type) – <i>phoom, phoop</i> (= <i>mates phlaok</i> type) – <i>woong</i> 	<ul style="list-style-type: none"> – <i>adek</i> – <i>nge</i> (= small fruit type) – <i>ee chem, ae chem</i> (<i>ee</i>: droppings, <i>chem</i>: birds) (= small fruit type) – <i>chem prew</i> (= <i>chaup</i> in Khmer) (= small fruit type) – <i>chugam</i> (= small fruit type) – <i>maï</i> (= small fruit type) – <i>lao</i> (Lao, of Laos) (= small fruit type)
<u>Tai-Kadai</u>			
Lao	<i>maek phit</i>	<ul style="list-style-type: none"> – <i>ngau</i> (<i>ngaa</i>: ivory) – <i>ryaav</i> (<i>ryaav</i>: long) – <i>phoom, phoom, phoo</i> (= <i>mates phlaok</i> type) 	<ul style="list-style-type: none"> – <i>kü nuu</i> (<i>kü</i>: droppings, <i>nuu</i>: rat) (= small fruit type) – <i>noy</i> (<i>noy</i>: small) – <i>thai</i> (<i>thai</i>: of Thailand) (= small fruit type) – <i>khooy meo</i> (<i>khooy</i>: penis, <i>meo</i>: cat) – <i>tamada</i> (<i>tamada</i>: normal) – <i>khao</i> (<i>khao</i>: white) (= greenish yellow fruit type)

Table 3. Preference for *Capstium*.

	Which fruits are hotter?				Which fruits smell better?				Which fruits do you prefer to eat?			
	C. f.*1		C. a.*1		C. f.		C. a.		C. f.		C. a.	
	S/U*1	Total	S/U*1	Total	S/U	Total	S/U	Total	S/U	Total	S/U	Total
Khmer	59 [GR:58, GY:1] ^{*2}	71	5	7	41 [GR:37, GY:4]	71	0	30	53 [GR:46, GY:7]	71	4	14
Khmer Khe	1 [GR:0, GY:1]	1	0	0	0 [GR:0, GY:0]	1	0	1	1 [GR:0, GY:1]	1	0	0
Suoy	2 [GR:2, GY:0]	3	0	1	1 [GR:1, GY:0]	2	0	1	1 [GR:1, GY:0]	2	0	1
Kuy	1 [GR:1, GY:0]	2	0	1	0 [GR:0, GY:0]	3	0	3	1 [GR:1, GY:0]	3	0	2
Brao	2 [GR:2, GY:0]	2	0	0	1 [GR:1, GY:0]	2	0	1	1 [GR:1, GY:0]	2	1	0
Krung	6 [GR:6, GY:0]	6	0	0	3 [GR:2, GY:1]	6	1	2	4 [GR:3, GY:1]	6	0	2
Kravet	1 [GR:1, GY:0]	1	0	0	0 [GR:0, GY:0]	1	0	1	1 [GR:1, GY:0]	1	0	0
Lun	1 [GR:1, GY:0]	1	0	0	1 [GR:1, GY:0]	1	0	0	1 [GR:1, GY:0]	1	0	0
Tampuan	5 [GR:5, GY:0]	5	0	0	2 [GR:2, GY:0]	5	0	3	3 [GR:3, GY:0]	5	0	2
Phnong	16 [GR:16, GY:0]	16	0	0	10 [GR:10, GY:0]	16	1	5	11 [GR:11, GY:0]	16	3	2
Kachok	1 [GR:1, GY:0]	1	0	0	0 [GR:0, GY:0]	1	0	1	1 [GR:1, GY:0]	1	0	0
Jarai	6 [GR:6, GY:0]	6	0	0	3 [GR:3, GY:0]	6	0	3	6 [GR:6, GY:0]	6	0	0
Lao	6 [GR:5, GY:1]	7	0	1	3 [GR:2, GY:1]	7	0	4	4 [GR:3, GY:1]	7	2	1
Total	107 [GR:104, GY:3]	122	5	10	65 [GR:59, GY:6]	122	2	55	88 [GR:78, GY:10]	122	10	24

*1: C.f.: *C. frutescens*, C.a.: *C. annuum*, S/U: Same or unknown.[]^{*2}: GR: small fruits of which immature fruit color was green, GY: fruits of which immature fruit color was greenish yellow.

Table 4. Perception of weedy forms of *Capsicum* and bird behavior toward fruits.

	Do you know weedy forms of <i>Capsicum</i> ?			Do you know birds eat its fruits?		
	Yes	No	Total	Yes	No	Total
Khmer	64 [CF:27, ALL:37] ^{*1}	7	71	69 [CF:12, ALL:57]	2	71
Khmer Khe	0 [CF:0, ALL:0]	1	1	1 [CF:0, ALL:1]	0	1
Suoy	3 [CF:1, ALL:2]	0	3	3 [CF:0, ALL:3]	0	3
Kuy	2 [CF:1, ALL:1]	0	2	2 [CF:1, ALL:1]	0	2
Brao	2 [CF:0, ALL:2]	0	2	2 [CF:1, ALL:1]	0	2
Krung	5 [CF:4, ALL:1]	1	6	6 [CF:0, ALL:6]	0	6
Kravet	1 [CF:1, ALL:0]	0	1	1 [CF:1, ALL:0]	0	1
Lun	1 [CF:0, ALL:1]	0	1	1 [CF:0, ALL:1]	0	1
Tampuan	5 [CF:2, ALL:3]	0	5	5 [CF:2, ALL:3]	0	5
Phnong	16 [CF:9, ALL:7]	0	16	16 [CF:4, ALL:12]	0	16
Kachok	1 [CF:1, ALL:0]	0	1	1 [CF:1, ALL:0]	0	1
Jarai	6 [CF:6, ALL:0]	0	6	6 [CF:3, ALL:3]	0	6
Lao	5 [CF:4, ALL:1]	2	7	7 [CF:4, ALL:3]	0	7
Total	111 [CF:56, ALL:55]	11	122	120 [CF:29, ALL:91]	2	122

[]^{*1}: CF: only *C. frutescens*, ALL: all kinds of *Capsicum* peppers except non-pungent varieties.

Table 5. Local names for birds that eat fruits of *Capsicum*.

Ethnic	Birds name	Ethnic	Birds name
Khmer	<i>moan</i> (: chicken) <i>sarikakeo</i> , <i>avong</i> (: minah) <i>poopech</i> (: kind of small bird, <i>Zosterops</i> spp. etc.) <i>seik</i> (: parrot) <i>chaap</i> (: sparrow) <i>leak</i> (: kind of heron) <i>kroling krolong</i> <i>angkrong</i> (: kind of ant) <i>krooch</i> (: partridge)	Tampuan	<i>iel</i> (: chicken) <i>chuang</i> (= <i>sarikakeo</i>) <i>ganchulek</i> (= <i>sarikakeo</i>) <i>saem</i> (<i>chaem</i>) <i>payaw</i> (= <i>poopech</i>) <i>piyam</i> , <i>payaw</i> (= <i>chaap</i>) <i>chaem chep</i> (= <i>chaap</i>) <i>chaem iyak</i> (= <i>kaek</i>) <i>pawut</i> (: a kind of small bird)
Khmer Khe	<i>moan</i> (: chicken) <i>srokaachuang</i> (= <i>sarikakeo</i>)	Phnong	<i>iyel</i> , <i>iyal</i> , <i>yaal</i> (: chicken) <i>aeng</i> , <i>eang</i> (= <i>sarikakeo</i>) <i>gew</i> (= <i>sarikakeo</i>) <i>chom</i> (<i>chem</i>) <i>rulew</i> (= <i>poopech</i>) <i>ooit</i> (= <i>chaap</i> ?) <i>ntaap</i> (= <i>lolook</i> , kind of turtledove, in Khmer)
Suoy	<i>poopech</i>		
Kuy	<i>rruai</i> (: chicken) <i>poopech</i>		<i>knyoong</i> <i>haalev</i> <i>thiamogn</i> (: black ant)

Table 5. Continued

Ethnic	Birds name	Ethnic	Birds name
Brao	<i>ial</i> (: chicken) <i>cheem</i> (= <i>chaap</i>) <i>pariyaw</i> (= <i>chaap</i>)	Kachok	<i>ail</i> (: chicken) <i>chem plew</i> (= <i>chaap</i> ?)
Krung	<i>iel</i> (: chicken) <i>jong</i> (= <i>sarikakeo</i>) (<i>chem</i>) <i>praliw</i> , <i>praliw</i> (= <i>chaap</i>) <i>arech</i> (: kind of small bird) <i>ka'ak</i> (= <i>ka'ek</i> in Khmer (: crow)) <i>braal</i>	Jarai	<i>nuk</i> (<i>nok</i>) (: chicken) <i>chim jyoong</i> (= <i>sarikakeo</i>) <i>chim prew</i> (<i>prev</i>) (= <i>chaap</i>)
Kravet	<i>ial</i> (: chicken) <i>jyoong</i> (= <i>sarikakeo</i>)	Lao	<i>kai</i> (: chicken) <i>nok sang kar</i> (: jack daw, mandarin black bird) <i>nok kaew</i> (= <i>avong</i>) <i>nok kbeek</i> <i>nok koot</i> (: large red finch living in bamboo)
Lun	<i>iel</i> (: chicken) <i>jyoong</i> (= <i>sarikakeo</i>) <i>pariyaw</i> (= <i>poopech</i>)		

Table 6. Use of *Capsicum* as a spice for family use.

	Dried fruits			Preserved fruits (soaked in liquid or in only salt)		
	Yes	No	Total	Yes	No	Total
Khmer	24	47	71	42 [W:2, B:21, R:3, P:5, S:1, O:8] ^{*1}	29	71
Khmer Khe	1	0	1	0 [W:0, B:0, R:0, P:0, S:0, O:0]	1	1
Suoy	1	2	3	3 [W:3, B:2, R:0, P:0, S:1, O:0]	0	2
Kuy	0	2	2	1 [W:0, B:1, R:0, P:0, S:0, O:0]	1	3
Brao	2	0	2	1 [W:0, B:1, R:0, P:0, S:0, O:0]	1	7
Krung	6	0	6	2 [W:1, B:1, R:0, P:0, S:0, O:0]	4	16
Kravet	1	0	1	1 [W:0, B:1, R:0, P:0, S:0, O:0]	0	2
Lun	0	1	1	1 [W:0, B:1, R:0, P:0, S:0, O:0]	0	6
Tampuan	3	2	5	4 [W:0, B:3, R:0, P:0, S:0, O:1]	1	1
Phnong	13	3	16	12 [W:0, B:5, R:7, P:0, S:0, O:0]	4	1
Kachok	1	0	1	0 [W:0, B:0, R:0, P:0, S:0, O:0]	1	5
Jarai	6	0	6	4 [W:0, B:2, R:2, P:0, S:0, O:0]	2	6
Lao	6	1	7	3 [W:0, B:2, R:0, P:0, S:0, O:1]	4	1
Total	64	58	122	74 [W:6, B:40, R:12, P:5, S:2, O:10]	48	122

[]^{*1}: fruits soaked in mainly W: unboiled water, B: boiled water, R: remained hot water when boiling rice, P: palm juice ("*tek tnaot aem*") or palm wine ("*tek tnaot chu*"), S: only salt, or O: others (fish sauce etc.). Results from multiple answer (MA).

Table 7. Use of *Capsicum* leaves.

Use of leaves of <i>Capsicum</i> peppers as vegetable			Questions for 116 people who eat leaves of <i>Capsicum</i>				How do you obtain leaves? ^{*2}			
	Yes	No	Total	Frequency of use (per month)		Home-garden	Field	Villager	Market	No data
				More than one time	Rarely					
Khmer	71 [SO:63, FR:1, OT:8] ^{*1}	0	71	27	26	18	3	23	12	19
Khmer Khe	1 [SO:1, FR:0, OT:0]	0	1	1	0	0	0	1	0	0
Suoy	3 [SO:1, FR:0, OT:2]	0	3	0	0	3	0	3	0	0
Kuy	2 [SO:2, FR:0, OT:0]	0	2	2	0	0	1	1	0	0
Brao	2 [SO:2, FR:1, OT:0]	0	2	2	0	0	2	0	1	0
Krung	4 [SO:4, FR:0, OT:0]	2	6	4	0	0	4	0	0	0
Kravet	1 [SO:1, FR:0, OT:0]	0	1	1	0	0	0	0	0	0
Lun	1 [SO:1, FR:1, OT:0]	0	1	1	0	0	0	0	0	0
Tampuan	5 [SO:5, FR:0, OT:1]	0	5	5	0	0	4	1	0	0
Phnong	13 [SO:13, FR:0, OT:0]	3	16	12	1	0	12	0	1	0
Kachok	1 [SO:1, FR:1, OT:0]	0	1	1	0	0	1	0	0	0
Jarai	6 [SO:6, FR:0, OT:0]	0	6	5	1	0	5	0	0	0
Lao	6 [SO:6, FR:0, OT:2]	1	7	5	1	0	2	2	0	0
Total	116 [SO:106, FR:4, OT:13]	6	122	66	29	21	34	31	14	19

^{*1}: they used leaves for SO: soup, FR: fried vegetables, and OT: others (colorant or dipping sauce). Results from multiple answer (MA).

^{*2}: results from multiple answer (MA).

Table 8. Medicinal uses of *Capsicum*.

	Medical use for people			Medical use for animals		
	Yes	No	Total	Yes	No	Total
Khmer	40 [F:30, L:6, R:13] ^{*1}	31	71	23 [CH:21, OT:2] ^{*2}	48	71
Khmer Khe	0 [F:0, L:0, R:0]	1	1	0 [CH:0, OT:0]	1	1
Suoy	0 [F:0, L:0, R:0]	3	3	2 [CH:2, OT:0]	1	3
Kuy	0 [F:0, L:0, R:0]	2	2	1 [CH:1, OT:0]	1	2
Brao	2 [F:0, L:0, R:2]	0	2	2 [CH:2, OT:0]	0	2
Krung	3 [F:3, L:0, R:1]	3	6	2 [CH:2, OT:0]	4	6
Kravet	0 [F:0, L:0, R:0]	1	1	1 [CH:1, OT:0]	0	1
Lun	0 [F:0, L:0, R:0]	1	1	1 [CH:1, OT:0]	0	1
Tampuan	3 [F:2, L:1, R:1]	2	5	4 [CH:4, OT:0]	1	5
Phnong	1 [F:0, L:0, R:1]	15	16	7 [CH:6, OT:1]	9	16
Kachok	0 [F:0, L:0, R:0]	1	1	0 [CH:0, OT:0]	1	1
Jarai	1 [F:1, L:0, R:0]	5	6	4 [CH:4, OT:1]	2	6
Lao	5 [F:4, L:2, R:2]	2	7	5 [CH:5, OT:0]	2	7
Total	55 [F:40, L:9, R:20]	67	122	52 [CH:49, OT:4]	70	122

[]^{*1}: F: fruit, L: leave, and R: root. Results from multiple answer (MA).

[]^{*2}: CH: chicken, OT: other animals (duck or water buffalo). Results from multiple answer (MA).

Table 9. Ritual uses of *Capsicum*.

	Ritual use			Taboo		
	Yes	No	Total	Yes	No	Total
Khmer	21	50	71	6	65	71
Khmer Khe	0	1	1	0	1	1
Suoy	0	3	3	0	3	3
Kuy	0	2	2	0	2	2
Brao	0	2	2	1	1	2
Krung	0	6	6	0	6	6
Kravet	0	1	1	1	0	1
Lun	0	1	1	0	1	1
Tampuan	0	5	5	0	5	5
Phnong	4	12	16	3	13	16
Kachok	0	1	1	0	1	1
Jarai	1	5	6	0	6	6
Lao	3	4	7	1	6	7
Total	29	93	122	12	110	122

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សង្ខេប

Use of Capsicum by Khmer and other ethnic groups in Cambodia

ដោយ Sota Yamamoto និង Tetsuo Matsumoto

ពពួកម្ទេស *Capsicum* ចេញកំណើតពីតំបន់ត្រូពិកនិងតំបន់ត្រជាក់ល្មមនៃទ្វីបអាមេរិក ហើយរីកសាយភាយទៅដល់អាស៊ីនៅស.វ.ទី១៦។ ក្នុងពពួកនោះមាន *C. annuum* និង *C. frutescens* ដែលគេដាំទូទៅនៅប្រទេសកម្ពុជា ប៉ុន្តែគេរុំស្ទុវដឹងថាអ្នកស្រុកចែកច្នាក់ថ្នាក់ដំពូកម្ទេសដូចម្តេចទេ។ អត្ថបទនេះជាសិក្សាលំអិត តាមទស្សនៈភាសា, រុក្ខជាតិនិងវប្បធម៌។ លទ្ធផលដែលបានមកបង្ហាញថា ប្រជាជនផ្សេងៗនៅប្រទេសកម្ពុជាប្រើម្ទេសតាមរបៀបប្លែកៗពីគ្នា មិនគ្រាន់តែជាគ្រឿងក្នុងម្ហូបប៉ុណ្ណោះឡើយ គឺប្រើជាបន្លែផង ជាថ្នាំផង ជាមេដំបែស្រាផង ជាគ្រឿងឱ្យពណ៌ផង ហើយពុំតែប៉ុណ្ណោះគឺប្រើក្នុងកិច្ចពិធីទាក់ទងនឹងកសិកម្ម និងក្នុងជំនឿទៀត។ តាមស្ថានមើលទៅ ប្រហែលខ្មែរប្រើម្ទេសជាថ្នាំព្យាបាលលើសពីជនជាតិដទៃទៀតនៅកម្ពុជា ដោយសារមាន “គ្រូខ្មែរ” ច្រើន។ ការសិក្សានេះបញ្ជាក់ថាម្ទេស *Capsicum* ចាក់ឫសជ្រៅនៅក្នុងវប្បធម៌ខ្មែរ ថ្វីត្បិតតែជារុក្ខជាតិនាំចូលមកពីក្រៅតែរវាង៤០០ឆ្នាំមុននេះក៏ដោយ។

Abstract

Use of Capsicum by Khmer and other ethnic groups in Cambodia

Sota Yamamoto and Tetsuo Matsumoto

Capsicum peppers are native to tropical and temperate regions of the Americas, and was introduced into Asia before the sixteenth century. Two of *Capsicum* species, *C. annuum* and *C. frutescens*, are now widely cultivated in Cambodia, but there is very little information on local nomenclature and detailed usage of *Capsicum* in Cambodia. In this study, *Capsicum* culture in Cambodia was studied in detail—linguistically, botanically, and ethnically. The results reveal that people in Cambodia use *Capsicum* in various ways, not only as a condiment but also as vegetable, as medicine, as colorant, in popular beliefs, in agricultural rituals, in taboos, and in rice malt. The Khmer may know more *Capsicum* remedies than other ethnic groups in Cambodia possibly because of the existence of *kruu khmer*. These findings indicate that *Capsicum* is deeply incorporated into their culture, even though it did not originate in Cambodia and only about 400 years have passed since its introduction.

Résumé

Use of Capsicum by Khmer and other ethnic groups in Cambodia

Sota Yamamoto and Tetsuo Matsumoto

Natifs des régions tropicales et tempérées d'Amérique, les piments de la variété *Capsicum* ont été introduits en Asie avant le 16^{ème} siècle. Deux espèces – *C. annuum* et *C. frutescens* – sont aujourd'hui largement cultivées au Cambodge, mais on savait peu des usages et des nomenclatures populaires. La présente étude examine en détail la culture du *Capsicum* du point de vue linguistique, botanique et ethnique. Il se révèle que les populations du Cambodge en font des usages variés, non seulement comme condiment, mais aussi comme légume, médicament, colorant, levure d'alcool, ainsi que dans les rites agraires et autres. Les Khmers utilisent le *Capsicum* dans les remèdes médicaux, peut-être plus que d'autres populations, en raison de l'abondance des *kruu khmer*. On voit que le *Capsicum* est profondément ancré dans leur culture, bien qu'il ne soit pas natif du Cambodge, mais importé il y a seulement environ 400 ans.