

HMONG GARDENS: BOTANICAL DIVERSITY IN AN URBAN SETTING¹

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Corlett, Jan L. (*Graduate Group in Geography, University of California, One Shields Avenue, Davis, CA 95616*), **Ellen A. Dean** (*UC Davis Herbarium, Section of Plant Biology, University of California, One Shields Avenue, Davis, CA 95616; e-mail eadean@ucdavis.edu*), and **Louis E. Grivetti** (*Department of Nutrition, University of California, One Shields Avenue, Davis, CA 95616*). HMONG GARDENS: BOTANICAL DIVERSITY IN AN URBAN SETTING. *Economic Botany* 57(3): 09em, 2003. *Since the end of the Vietnam War, thousands of Laotian Hmong have immigrated to the United States, many ultimately resettling in the Central Valley of California. In the inner-city environment of Sacramento, the Hmong continue their agrarian traditions by creating urban gardens where they grow traditional plants. In this study, we document 59 Hmong garden species grown at a site in South Sacramento. Most of these species are documented in the Southeast Asian botanical literature as either food or medicinal plants. Uses of the plants are discussed as is the importance of urban gardens in maintaining Hmong cultural identity and practices.*

Key Words: Hmong Gardens; Laotian immigrants; Sacramento; food and medicinal plants.

The literature on tropical homegardens is extensive and encompasses gardens worldwide (Bittenbender 1985; Fernandes and Nair 1986; Simoons 1965). Homegardens have been cited as important venues for food production (Fernandes and Nair 1986), plant domestication (Kimber 1978), and the transfer of traditional knowledge from generation to generation (Moreno-Black et al. 1996). They have also been found to be an expression of the self-worth of the horticulturists (often women) who tend them (Moreno-Black et al. 1996). These observations are similar, not surprisingly, to those made by researchers of urban gardens, who have argued that plants grown in urban gardens should be viewed as cultural markers, items that provide consumers with common identities and a means to reinforce cultural practices (Bequette 1999; Grivetti 1978; Grivetti and Paquette 1978; Romero-Gwynn et al. 1993).

In the aftermath of the Vietnamese-American War, as thousands of Southeast Asian refugees resettled in the United States, urban gardens planted by these new immigrants became part of the American urban landscape. Southeast Asian

gardens were initially studied in New Orleans, Louisiana. Researchers found that most gardens were tended by elderly Vietnamese with little knowledge of English and few employment skills, who experienced overdependence upon their English-fluent children, reduced mobility, and breakdown of the extended family, factors that contributed to low self-esteem. Tending urban gardens, however, produced an improved sense of self-worth and responsibility and contributed fresh produce to reduce household food expenditures (Airriess and Clawson 1991, 1994). Similarly, a study of Southeast Asian Hmong immigrants living in the Central Valley of California found that their gardens are considered "reconstructed landscapes," places where traditional agricultural skills remain essential in daily life (Helzer 1994:58).

Southeast Asian urban gardens, although contributing positively to the households of the gardeners, have produced an inevitable cultural collision between Southeast Asian newcomers and Americans. Vietnamese refugees have been cautioned not to garden in their front yards, because such activities are viewed as unsightly by neighbors. Asian families also have been disadvantaged by municipal ordinances that prohibit keeping livestock within city limits, with the re-

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sult that families that wished to garden were deprived of a traditional source of organic fertilizer. The sustainability of Vietnamese urban gardens also has been questioned, because it is unclear whether or not younger community members will remain interested in gardening as they become acculturated within mainstream America (Airriess and Clawson 1991, 1994).

Our overall objective in this study was to investigate the urban gardens of Hmong immigrants in central California to determine species raised and their nutritional composition (Corlett et al. 2002), how community gardens function in Hmong social and family life, and to examine gardens as urban landscape features (Corlett 1999). Reported here are data on plant frequencies and ethnobotanical uses of garden species by Hmong immigrants to central California.

BACKGROUND

The Hmong, whose traditional homeland was Laos, were trained and supported by the American CIA during the Vietnamese War, and after conclusion of hostilities in 1975, many Hmong faced an unclear future and entered refugee camps across the border in Thailand (Dao 1993). After resettlement in the United States secondary migration ultimately concentrated more than half the Hmong population in the Central Valley region of California. The agricultural reputation was a primary motivation for Hmong migration to this area, and families believed they could establish farms to support themselves (Finck 1986; Sherman 1985; Tapp 1985; Vangyi 1986). California agriculture, however, is primarily large-scale, commercial farming, and lifeways common to the hills of Laos could not be re-established on the valley floor. As a result most Hmong immigrants to California found themselves located in urban centers, where they experienced problems of social adjustment to their new environment. Many, however, did not lose their desire to cultivate; farms became smaller gardens established amid zones of urban poverty, and the appearance of Hmong traditional foods in these gardens ultimately became visible marks on the land, characteristic landscape features for description and analysis (Helzer 1994).

Plants cultivated by the Hmong in Laos were identified and categorized during the late 1950s. Hmong farmers traditionally cultivated three agricultural fields, one each for primary production of maize, rice and opium. Rice was for people,

maize for pigs and humans, and opium was grown as a cash crop. Varieties of rice grown were not irrigated and Hmong fields were intercropped with chilis, cucumber, ginger, melon, taro, and yam. Maize fields commonly were intercropped with banana, papaya, and pumpkin, whereas a suite of vegetables especially Chinese cabbage and cilantro were commonly grown in Hmong opium fields. Coriander and aromatic leaves (unspecified) also were common condiments grown throughout Hmong territory (Vidal 1959; Vidal and Lemoine 1970). A more recent study completed by Anderson in Thailand (Anderson 1993) found that Hmong farmers not only cultivated larger fields of crops, but also tended home gardens that are planted near their villages. Such gardens included a wide variety of useful medicinal, fiber, dye, and food plants.

Several previous studies have remarked that Hmong herbs offered important culinary contributions, however botanical identifications of the species involved were not provided (Bliatout 1986; Ensign 1994; Ikeda et al. 1991; Potter and Whiren 1982; Tapp 1985; Thao 1986). Species identifications of culinary and medicinal herbs used by hill tribes in northern Thailand have proved useful in the identification of plant species used by Hmong refugees in Thailand (Anderson 1986, 1993; Pake 1987). Other research in Laos has focused on the species identification of plants cultivated for food, but did not attempt to identify herbs used by the Hmong (Vidal and Lemoine 1970).

An early report of medicinal plants used by Hmong resettled in Minnesota has provided a baseline for understanding Hmong plant nomenclature (Spring 1989), although Hmong shamans living in the United States have commented that their botanical knowledge is virtually worthless in America given differences in available flora (Ensign 1994). The lack of familiar plants has led to the importation of traditional Hmong herbs to California, whether through overt commercial exchange or through covert personal transportation. As a result, use of traditional herbal medicine has remained part of the world of Hmong women in the United States, where gifted elders have continued to teach female relatives and trusted friends (Thao 1986), and herbal medicine has continued to be an important component of Hmong obstetrical care among immigrants to America (Potter and Whiren 1982; Thao 1986; Tuttle and Dewey 1994).

STUDY SITE

The study site was located in south-central Sacramento, California, and was selected by direct observation. Census tract data for Sacramento County were used to identify neighborhoods with the highest concentrations of Hmong residents. Three geographical areas in Sacramento were identified for potential inclusion. The area selected was chosen because of strong support by the management and staff of the apartment complex adjacent to the gardens. Introductions to the members of the complex Garden Association were provided by the apartment Services Coordinator. Permission was granted to conduct the study, and a list of garden members provided for recruitment purposes. During the survey period the senior author volunteered to teach English as a Second Language (ESL) to the apartment residents, an activity that facilitated recruitment.

METHODS

Potential participants were recruited during informal conversations at apartment complex meetings, at the conclusion of ESL classes, and by approaching individuals at work in their gardens. A Hmong female college student was hired and trained as a research assistant to provide Hmong-English translations. The survey period lasted from January to October 1997. Eight women were interviewed about their winter gardens and ten women were interviewed about their summer gardens (Table 1) for a total of 18 respondents.

Research protocols (interview forms; garden checklists) were submitted for review to the Committee on Use of Human Subjects, University of California, Davis (UC Davis), and to the Garden Association Board, and approved. A waiver for signed consent was granted due to limited literacy skills in the population to be surveyed. Verbal permissions were received and recorded during the interview process. Interviews with gardeners were conducted in Hmong, tape recorded, translated, and transcribed into English. Additional interviews were conducted with the apartment Manager, Assistant Manager and Services Coordinator to determine the economic and political history of the garden site.

Each plot within the community garden ($n = 146$) was mapped during the summer growing season using traditional tools of plane table and

alidade. The Garden Association had 58 members and 112 registered plots. The additional plots (34) had been added around the perimeter of the south garden, but were not assigned by the Garden Association. Hmong residents comprised only 40% of the membership of the Garden Association, yet they cultivated 79% of the plots. Pacific Islanders from Fiji were 8% of the membership and gardened 12% of the plots. The remaining 8% of the plots were registered to members of various ethnic backgrounds. The initial mapping of all plants and frequencies was used to determine if the ethnicity of the gardener could be determined by the plant configuration. Exotic herbs were the most unique and easily visible feature of Hmong gardens, however, they were not present in each garden plot. For those women who cultivated more than one plot, the herbs were concentrated in only one of them, while the additional plots produced vegetables. In the end, 26 summer plots belonging to 10 participants were mapped in detail, with the presence or absence of each species in the plots recorded. The plots that were sampled during the winter months were not mapped in detail, due to heavy rains and flooding.

Participants provided permission to photograph and to collect plant samples for identification and laboratory analysis. Specimens of most species from both summer and winter gardens were collected, pressed, and transported using standard procedures (Smith et al. 1996; Bye 1986). Pressed samples of 76 garden plants were transported to the herbarium at UC Davis for identification. In instances where identifying components were not readily apparent, cuttings or whole plants were obtained and grown in greenhouse facilities at UC Davis until flowers were produced. Vouchers were deposited in the UC Davis Herbarium (Table 2).

Common Hmong names for plants were obtained from standard botanical references (Spring 1989; Vidal and Lemoine 1970), and from the respondents. Names were transcribed using the Smalley Romanized Popular Alphabet writing system (Smalley, Vang, and Yang 1990), and two dialect differences (Green Hmong; White Hmong) were recorded.

RESULTS

DEMOGRAPHICS

Eighteen Hmong women provided data on their garden plots, ten summer gardeners and

TABLE 1. SPECIES DOCUMENTED IN SUMMER GARDENS ARRANGED BY THEIR FREQUENCY OF OCCURRENCE (RECORDED AS NUMBER OF PARTICIPANTS HAVING THE SPECIES IN THEIR GARDEN).

Scientific name	# of women	%	Younger women	Elderly women
<i>Cucumis sativus</i>	10	100%	5	5
<i>Cucurbita</i> sp.*	10	100%	5	5
<i>Sorghum bicolor</i>	10	100%	5	5
<i>Zea mays</i> *	10	100%	5	5
<i>Capsicum annuum</i>	9	90%	5	4
<i>Coriandrum sativum</i>	9	90%	5	4
<i>Cymbopogon citratus</i> *	9	90%	4	5
<i>Eupatorium lindleyana</i>	9	90%	4	5
<i>Allium chinense</i>	8	80%	4	4
<i>Mentha spicata</i>	8	80%	5	4
<i>Phaseolus vulgaris</i>	8	80%	5	3
<i>Celosia argentea</i>	7	70%	3	4
<i>Momordica charantia</i>	7	70%	5	2
<i>Ocimum basilicum</i>	7	70%	4	3
<i>Polygonum odoratum</i>	7	70%	4	3
<i>Dendranthema indicum</i>	6	60%	3	3
<i>Lycopersicum esculentum</i> *	6	60%	3	3
<i>Sechium edule</i>	6	60%	3	3
Voucher 28, Asteraceae?	6	60%	3	3
<i>Acorus gramineus</i>	5	50%	2	3
<i>Sedum</i> aff. <i>spectabile</i>	5	50%	2	3
<i>Solanum aethiopicum</i>	5	50%	2	3
<i>Solanum melongena</i> * (green variety)	5	50%	3	2
<i>Solanum melongena</i> * (purple variety)	5	50%	2	3
<i>Solanum nigrum</i>	5	50%	3	2
<i>Vigna unguiculata</i> var. <i>esquipedalis</i> *	5	50%	3	2
aff. <i>Angelica</i>	4	40%	1	3
<i>Colocasia esculenta</i>	4	40%	1	3
<i>Leonorus artemisia</i>	4	40%	1	3
<i>Sedum</i> aff. <i>sarmentosum</i>	4	40%	1	3
<i>Iris</i> or <i>Belamcandra</i> sp.	4	40%	0	4
<i>Achillea millefolium</i>	3	30%	0	3
<i>Basella alba</i>	3	30%	0	3
<i>Brassica juncea</i>	3	30%	2	1
<i>Brassica oleracea</i> *	3	30%	2	1
<i>Canna indica</i>	3	30%	0	3
<i>Hydrocotyle javanica</i>	3	30%	1	2
<i>Luffa acutangula</i>	3	30%	2	1
<i>Lycopersicum esculentum</i> *	3	30%	1	2
<i>Gynura</i> aff. <i>procumbens</i>	3	30%	0	3
aff. <i>Hemerocallis</i>	3	30%	2	1
<i>Anethum graveolens</i> *	2	20%	2	0
<i>Capsicum</i> aff. <i>annuum</i>	2	20%	0	2
<i>Capsicum frutescens</i>	2	20%	2	0
<i>Citrullus</i> sp.*	2	20%	2	0
<i>Cucurbita</i> aff. <i>moschata</i>	2	20%	2	0
<i>Cucurbita pepo</i> *	2	20%	2	0
<i>Polygonum</i> aff. <i>cymosum</i>	2	20%	0	2
<i>Polygonum runcinatum</i>	2	20%	0	2
Voucher 53, Asteraceae?	2	20%	1	1
Voucher 34, unknown	2	20%	0	2
Voucher 45, unknown	2	20%	0	2

TABLE 1. CONTINUED.

Scientific name	# of women	%	Younger women	Elderly women
<i>Anredera cordifolia</i> *	1	10%	1	0
<i>Capsicum</i> aff. <i>annuum</i>	1	10%	0	1
<i>Citrullus vulgaris</i> *	1	10%	0	1
<i>Colocasia esculenta</i>	1	10%	0	1
<i>Crassocephalum crepidioides</i>	1	10%	0	1
<i>Euphorbia latharis</i>	1	10%	0	1
<i>Fragaria vesca</i> *	1	10%	1	0
<i>Helianthus annuus</i> *	1	10%	0	1
<i>Houttuynia cordata</i>	1	10%	0	1
<i>Impatiens balsamina</i>	1	10%	0	1
<i>Justica gendarussa</i>	1	10%	0	1
<i>Kalimeris indica</i>	1	10%	1	0
<i>Lactuca sativa</i>	1	10%	1	0
<i>Lactuca</i> sp.	1	10%	0	1
<i>Lagenaria siceraria</i> (?)	1	10%	1	0
<i>Lathyrus odoratus</i> *	1	10%	0	1
<i>Mimosa pudica</i>	1	10%	0	1
<i>Oxalis corymbosa</i>	1	10%	0	1
<i>Ricinus communis</i> *	1	10%	0	1
<i>Saccharum officinarum</i> *	1	10%	1	0
<i>Solanum pseudocapsicum</i>	1	10%	0	1
<i>Strobilanthes</i> sp.	1	10%	0	1
<i>Teucrium viscidum</i>	1	10%	0	1
<i>Trichosanthes</i> sp.	1	10%	0	1
<i>Verbena officinalis</i>	1	10%	0	1
Voucher 25, Iridaceae?	1	10%	0	1
<i>Zingiber</i> ?	1	10%	0	1

* No voucher collected.

eight winter gardeners. Of the 10 summer gardeners, five women were clustered into an elderly age cohort (average age 70; range 62–85), whereas five women were defined as the younger cohort (average age 28; range 23–38). Of the eight winter gardeners, one woman was in the elderly age cohort and seven women were in the younger age cohort.

All elderly women were widowed or separated from their husbands; only one had a minor child who still lived at home. All younger women were married with an average of five children who lived at home. Elderly Hmong women tended an average of three plots (total space 6049 ft.²); younger women cultivated an average of two plots (total space 4610 ft.²). Child care and household responsibilities limited gardening activities and number of plots cultivated by younger women. Members of the younger cohort had lived in the nearby apartment complex an average of four years, and had gardened an average

of three years; elderly women, in contrast, joined the housing complex later and tended gardens an average of two years. Elderly women grew an average of 32 different plants (range: 8–47); younger women cultivated 26 (range: 20–28). Differences between the two generation cohorts was due primarily to the greater variety of medicinal plants grown by elderly women. The one exception was the oldest Hmong woman interviewed, who had only eight varieties present and tended only one plot. She was in poor health at the time of the study. More importantly, however, she was a respected healer in the community and she preferred to work with barks and roots rather than fresh herbs. Family members still living in Laos kept her supplied with barks and roots gathered near their village.

GARDEN CROPS

Seventy-six garden crop specimens were collected and 73 were retained and deposited in the

TABLE 2. LIST OF BOTANICAL VOUCHERS, NAMES, AND USES FOR PLANTS COLLECTED BY JAN CORLETT DURING THE COURSE OF THIS STUDY. REFERENCE NUMBERS REFER TO REFERENCES CITING THE SPECIES IN QUESTION. REFERENCES ARE LISTED AT THE END OF THE TABLE.

Family	Botanical name	English name(s)	Hmong name(s) Green (G), White (W)
(unknown)	monocot		pawj kua npua (W)
(unknown)	dicot, resembles <i>Asarum</i>		
Acanthaceae	<i>Justica gendarussa</i> Burm. f.		
Acanthaceae	<i>Strobilanthes</i> sp.		nkaj (W)
Alliaceae	<i>Allium chinense</i> G. Don	onion, Chinese chives	dlog (G), dos (W)
Amaranthaceae	<i>Celosia argentea</i> L.	cockscorn, quail grass	paaj qab ib (G) zaub luag qab (G)
Apiaceae	aff. <i>Angelica</i>	angelica	ko taw os (W)
Apiaceae	<i>Coriandrum sativum</i> L.	cilantro, coriander, Chinese parsley	zaub txib qab (G), zaub txhwb qaib (W)
Apiaceae	<i>Hydrocotyle javanica</i> Thumb.	pennywort	lauj vag (W)
Araceae	<i>Acorus gramineus</i> Soland.	Chinese sweet grass, aquatic sword grass	pawj as (G), pawj qaib (W)
Araceae	<i>Colocasia esculenta</i> (L.) Schott. (small variety)	taro, elephant ears, da- sheen, cocoyam	kaav ywj (G), qos tsov (W)
Araceae	<i>Colocasia esculenta</i> (L.) Schott. (very large variety)	taro, elephant ears, da- sheen, cocoyam	kaav ywj (G), qos tsov (W)
Asteraceae	<i>Achillea millefolium</i> L.	yarrow, milfoil	tshuaj npuav hniav (W)
Asteraceae	<i>Crassocephalum crepidioi-</i> <i>des</i> (Benth.) S. Moore	velvet plant	chais qav (W)
Asteraceae	<i>Dendranthema indicum</i> (L.) Des Moul.		thaab kib (G), ntxab koob (W)
Asteraceae	<i>Eupatorium lindleyana</i> DC.	hemp agrimony, water hemp	ntiv (G, W)
Asteraceae	<i>Gynura</i> aff. <i>procumbens</i> (Lour.) Merr.		tshuaj tsog (G, W) "medi- cine that will make you fat"
Asteraceae	<i>Kalimeris indica</i> (L.) Schultz-Bip.	malan	
Asteraceae	<i>Lactuca sativa</i> L.	lettuce	zaub (G, W)
Asteraceae	<i>Lactuca</i> sp.		
Asteraceae?	(green variety)		thaab kib dlawb (G), ko taw os ntsuab (W0) "green duck's feet"
Asteraceae?	(red variety)		ko taw os hab (W) "red duck's feet"
Balsaminaceae	<i>Impatiens balsamina</i> L.	balsam, garden balsam, touch-me-not	paaj nti ntuav (G), paj co ntiv (W)
Basellaceae	<i>Basella alba</i> L.	Ceylon spinach, Indian spinach	hmaab ntshaa (G), hmaab ntsha (W)
Brassicaceae	<i>Brassica</i> aff. <i>napus</i> L.	mustard, rape, colza	zaub ntsuab (G, W)
Brassicaceae	<i>Brassica juncea</i> Coss.	mustard, Indian mustard, Chinese mustard	zaub ntsuab (G, W)
Brassicaceae	<i>Brassica juncea</i> Coss.	mustard, Indian mustard, Chinese mustard (flow- ering variety)	zaub ntsuab (G, W)
Cannaceae	<i>Canna indica</i> L.	Indian shot	nplooj nre lab (G), qhau liab (W) "red leaves"

TABLE 2. EXTENDED.

Voucher	Use category	Specific use	References
45	Food/Med.	Leaves used as a seasoning for pork/for stomach problems	
34	Med.	Leaves used in postpartum diet	
69	Med.	Leaves used for pulled muscles	2, 7
70	Med.	Leaves used for headache or bruises	2, 7
5	Food	Leaves used as seasoning	2, 4, 5, 7
16	Food/Med./Ornam.	Leaves edible/unknown medicinal use	1, 2, 5, 7
44	Food/Med.	Leaves used as seasoning for chicken/as a general tonic	7
1	Food	Leaves used as seasoning	2, 7, 9, 8, 3, 4
59	Food/Med.	Leaves used as edible green/for cough	2, 7, 8
30	Food/Med.	Leaves used as seasoning for chicken/as part of a postpartum diet	1, 2, 7, 8
57	Food/Med.	Stem and leaves edible/stems used for swelling	1, 2, 3, 4, 5, 7, 8, 9
17	Med.	Stem used to help dying people speak	1, 2, 3, 4, 5, 7, 8, 9
23, 62, 75	Med.	Leaves used for cold sores and swollen gums	7
55	Med.	Leaves used for heartburn or indigestion	5
22	Food/Med.	Leaves used as seasoning for chicken/for weakness (as tonic), cough, or bruises	7
42	Food/Med.	Used sparingly as seasoning for chicken/for weakness in arms or legs	7
29	Food/Med.	Leaves used as a seasoning for chicken/as a general tonic, as part of a postpartum diet	3, 7
50	Med.	Specific use unknown	7
6	Food	Leaves edible	2, 3, 7
26	Food	Leaves used as a seasoning for chicken	2, 3, 7
53	Med.	Leaves used as a seasoning for chicken	
28	Food/Med.	Leaves used as a seasoning for chicken/as a general tonic or for bruises	
19	Med.	Flowers used in infusion to hasten child-birth	1, 2, 7, 8
43	Food/Med.	Leaves used as a seasoning for chicken/as a general tonic, for arthritis or backache	1, 2, 3, 4, 5, 7, 8
3	Food	Leaves and stems edible	2, 3
2	Food	Leaves and stems edible	3, 4, 9, 2
4	Food	Leaves and stems edible	3, 4, 9, 2
65, 68	Med./Ornam.	Leaves used as a general tonic, for indigestion, stomachache, or cough	2, 3, 7

TABLE 2. CONTINUED.

Family	Botanical name	English name(s)	Hmong name(s) Green (G), White (W)
Crassulaceae	<i>Sedum</i> aff. <i>sarmentosum</i> Bunge	stringy stonecrop	nplai zeb (G), kuab nplais dib (W)
Crassulaceae	<i>sedum</i> aff. <i>spectabile</i> Bor.	stonecrop	kuab nplais taub (W)
Cucurbitaceae	<i>Cucumis sativus</i> L.	cucumber	dlib (G), dib (W)
Cucurbitaceae	<i>Cucurbita</i> aff. <i>moschata</i> (Duch. ex. Lam.) Duch. ex. Poir.	squash.white	taub
Cucurbitaceae	<i>Luffa acutangula</i> (L.) Roxb.	angled luffa	taub ntxuav yag (G), taub ntxauv yias (W)
Cucurbitaceae	<i>Momordica charantia</i> L.	bitter cucumber, balsam pear, bitter gourd	dlib ab (G), dib iab (W)
Cucurbitaceae	<i>Sechium edule</i> (Jacq.) Sw.	chayote	taub taaj (G), taub taj (W) “furry squash”, taub maum (W)
Cucurbitaceae	<i>Trichosanthes</i> sp.		taub (G, W)
Euphorbiaceae	<i>Euphorbia latharis</i> L.	mole plant, caper spurge, petroleum plant	txiv kuab maj (W)
Fabaceae	<i>Mimosa pudica</i> L.	sensitive plant, touch-me- not	tshuaj tsaug zug (G), tshuaj tsuag zog (W)
Fabaceae	<i>Phaseolis vulgaris</i> L.	bean, kidney bean	taum laag (G), taum lag (W)
Hemerocallidaceae?	aff. <i>Hemerocallis</i>		chaag dlaaj chaag dlawb (G), chag daj chag dawb (W)
Iridaceae?	<i>Iris</i> sp. or <i>Belamcandra</i> <i>chinensis</i>	iris	oob noog ntxuam (W) “bird flapping wings”
Iridaceae?			ntxoob ntug liab (W)
Lamiaceae	<i>Leonorus artemisia</i> S. Y. Hu	Chinese motherwort	maj qab ntug (W)
Lamiaceae	<i>Mentha spicata</i> L.	mint, spearmint	pum hum (G), pum hub (W)
Lamiaceae	<i>Ocimum basilicum</i> L.	basil, sweet basil, garden basil (purple flowers)	zaub txis them (G, W) “vegetable that grows in steps”
Lamiaceae	<i>Ocimum basilicum</i> L.	basil, sweet basil, garden basil (white flowers)	zaub txis them (G, W) “vegetable that grows in levels”
Lamiaceae	<i>Teucrium viscidum</i> Blume	germander	pum tshis nyeg (G, W)
Oxalidaceae	<i>Oxalis corymbosa</i> DC.	violet wood sorrel	nruas ntsev nyeg (G, W)
Poaceae	<i>Sorghum bicolor</i> (L.) Moench	sorghum, sweet sorghum	quav ntsuas (G, W)
Polygonaceae	<i>Polygonum</i> aff. <i>cymosum</i> Trev.	knotweed	
Polygonaceae	<i>Polygonum odoratum</i> Lour.	knotweed	luam laws (G, W)
Polygonaceae	<i>Polygonum runcinatum</i> Buch.-Ham. ex. D. Don	knotweed	qaub nraug (W)
Saururaceae	<i>Houttuynia cordata</i> Thunb.	stinky peony stink grass, nipple grass, fishwort	kab tsaus (W)
Solanaceae	<i>Capsicum</i> aff. <i>annuum</i> L.	chili, red pepper, cayenne	hov txob nplej (G), kua txob (W)

TABLE 2. EXTENDED. CONTINUED.

Voucher	Use category	Specific use	References
32	Food/Med.	Leaves used as a seasoning for chicken/for dry mouth, upset stomach, or sores	
31	Food/Med.	Leaves used as a seasoning for chicken/for upset stomach or sores	
7, 27	Food	Fruits edible	2, 3, 4, 7, 9
10, 15	Food	Fruits edible	2, 4, 5
9	Food	Fruits edible	2, 3, 4, 7
8	Food	Leaves and fruits edible	2, 3, 4, 5, 7, 9
63	Food	Fruits edible	2, 3, 4, 9
11	Food	Fruits edible	2, 3, 7
41	Med.	Seeds used for indigestion	7
71	Med.	Leaves used for fever	2, 7
37	Food	Grains edible	2, 3, 4
52	Food/Med.	Leaves used as a seasoning for chicken/as a tonic for anaemia	2, 3, 7
67	Med.	Leaves used for indigestion	2, 7, 8
25	Med.	Leaves used for fever or indigestion	
36, 72	Med./Fiber	Leaves used as a general tonic, for nausea/ stems used to make clothing	7
33, 56	Med.	Leaves used as a seasoning for beef	4, 7
66	Food	Leaves used as seasoning	1, 2, 3, 4, 6, 7, 8
54, 60	Food	Leaves used as a seasoning for fish or noodles	1, 2, 3, 4, 6, 7, 8
18, 73	Med.	Leaves used for stomachache	2, 7
49	Food/Med.	Leaves used as a seasoning for chicken/for cough or weakness in arms or legs	
38	Food	Stems edible—source of sugar	2
35	Food/Med.	Leaves edible/for stomachache	
39	Food	Leaves and stems used as seasoning for fish	3, 5, 7
40	Med.	Leaves used for heartburn or indigestion	8
51	Med.	Leaves used for colds, cough, or fever	2, 5, 7, 8
46, 47, 48	Food	Fruits used as seasoning	2, 3, 4, 7

TABLE 2. CONTINUED.

Family	Botanical name	English name(s)	Hmong name(s) Green (G), White (W)
Solanaceae	<i>Capsicum annuum</i> L.	chili, red pepper, cayenne	hov txob nplej (G), kua txob (W)
Solanaceae	<i>Capsicum frutescens</i> L.	chili, bird pepper, red bush pepper, cayenne	hov txob nplej (G), kua txob (W)
Solanaceae	<i>Solanum aethiopicum</i> L.	scarlet eggplant, ornamental eggplant, tomato eggplant	txiv lwg ab, pos ab (G), txiv lws iab, pos iab (W)
Solanaceae	<i>Solanum nigrum</i> L.	nightshade, black nightshade	zaub ab (G), zaub iab (W)
Solanaceae	<i>Solanum pseudocapsicum</i> L.	Jerusalem cherry, Madeira winter cherry	txiv ab (G), txiv iab (W) "bitter fruit"
Verbenaceae	<i>Verbena officinalis</i> L.	vervain, verbena	kab laug zog (W)
Zingiberaceae?	<i>Zingiber?</i>		shaam muas kaab (G), chau (W)

References: 1 (Anderson, 1986), 2 (Anderson, 1993), 3 (Crevost and Lamarie, 1917), 4 (Herklots, 1972), 5 (Jacquat, 1990), 6 (Pake, 1987), 7 (Perry, 1978), 8 (Spring, 1989), 9 (Vidal and Lemoine, 1970)

UC Davis Herbarium. Of these 73 plants, representing 59 different taxa, at least partial botanical identifications were completed for all but four (Hmong names were obtained for all plants) (Table 2). Of the identified taxa, 25 plant families are represented; the plant families with the highest frequency are Asteraceae (10 samples, 8 taxa), Cucurbitaceae (6 taxa), and Solanaceae (9 samples, 6 different taxa). Thirty-eight of the taxa were used for food, 36 for medicine, three as ornamentals, and one for fiber. Many plants were multipurpose plants, with 15 being used for both food and medicine, one for food and as an ornamental, one for medicine and as an ornamental, one for medicine and fiber, and one for food, medicine, and as an ornamental. Many of the plants that were categorized as being used for both food and medicine were primarily used as food seasonings or additives, especially for chicken. Nearly all of the plants identified have been documented as useful plants in the Southeast Asian ethnobotanical literature (Table 2).

DISCUSSION

MOST FREQUENTLY CULTIVATED WINTER CROPS

The primary winter crops were onions (*Allium chinense*), garlic (*Allium tuberosum*, no voucher taken), mustard greens (*Brassica juncea*, *Brassica* aff. *napus*), cilantro (*Coriandrum sativum*),

and lettuce (*Lactuca sativa*). In the summer, the weather was too hot for the mustards to do well, but cilantro and onions remained plentiful.

MOST FREQUENTLY CULTIVATED SUMMER CROPS

All the Hmong women interviewed regarding their summer gardens grew cucumbers (*Cucumis sativus*), pumpkin or other squash (*Cucurbita* spp.—vouchers of all species not collected), sweet sorghum (*Sorghum bicolor*), and maize (*Zea mays*—no voucher collected) in at least one plot. Other commonly cultivated summer crops (cultivated by 70–90% of the women interviewed) included onion (*Allium chinense*), cockscomb (*Celosia argentea*), cilantro (*Coriandrum sativum*), chili pepper (*Capsicum annuum*), lemon grass (*Cymbopogon citratus*—no voucher collected), hemp agrimony (*Eupatorium lindleyana*), mint (*Mentha spicata*), beans (*Phaseolus vulgaris*), bitter melon (*Momordica charantia*), basil (*Ocimum basilicum*), and knotweed (*Polygonum odoratum*) (Table 1). The majority of these very common taxa are used for food or seasoning, with the exceptions being *Eupatorium lindleyana* (used as a medicinal and very sparingly as a bitter seasoning) and *Celosia argentea* (which is a multipurpose plant that is mainly grown as an ornamental).

Of the plants cultivated by all ten women,

TABLE 2. EXTENDED. CONTINUED.

Voucher	Use category	Specific use	References
13	Food	Fruits used as seasoning	2, 3, 4, 7
14	Food	Fruits used as seasoning	2, 3, 4, 7, 9
21	Food	Fruits edible	
24, 64	Food	Leaves edible after boiling	2, 7, 8
61	Food/Orn.	Fruits edible	
74	Med.	Leaves used for stomach problems	2, 7, 8
76	Med.	Specific use unknown	2, 7, 3, 9, 5

Cucumis sativus, *Zea mays* and various species of *Cucurbita* have been documented as food crops grown by Hmong in Thailand and Laos. *Sorghum bicolor*, on the other hand, has been reported only as livestock fodder by Hmong living in Thailand, and is rarely eaten there (Anderson 1993). In Thailand and Laos, the climate is suitable for sugar cane (*Saccharum officinarum*) and the children chew the stems of that species as sweet snacks (Anderson 1993; Vidal and Lemoine 1970). In California, sweet sorghum has been substituted for this purpose, with only one young Hmong woman growing sugar cane (*Saccharum officinarum*—no voucher collected) in her garden.

Of the other commonly cultivated food or seasoning plants, chili peppers (*Capsicum annuum*), cilantro (*Coriandrum sativum*), spearmint (*Mentha spicata*), bitter melon (*Momordica charantia*), basil (*Ocimum basilicum*), and beans (*Phaseolus vulgaris*) have been reported as being cultivated by Hmong living in Laos and Thailand (Anderson 1993; Vidal and Lemoine 1970) or by Hmong relocated to Minnesota (Spring 1989). Chinese onion (*Allium chinense*) and knotweed (*Polygonum odoratum*) are very common condiments in Asian cuisine, however to our knowledge, neither had been documented as a Hmong food plant previously. Various medicinal uses have been listed in the literature for *Polygonum odoratum*, among them a diuretic, febrifuge, and nauseant (Perry 1978; Uphof

1968), but these medicinal uses were not reported by the participants of this study.

Cockscomb (*Celosia argentea*) was one of three species reported as an ornamental in the gardens. The women said that the young leaves could be eaten, but that the plant primarily served as a garden ornamental and was not specifically cultivated. This species is often a weed in tropical countries and is probably of Asian origin (Bailey 1949). The roots and flowers have been used medicinally in northern Thailand for body pain, stomachache, itching, worms, measles, menstrual cramps and anemia, either as an infusion or a poultice (Anderson 1993; Perry 1978). Hmong women in this study reported its use as a medicinal, but could not recall treatment uses.

Eupatorium lindleyana (hemp agrimony) was the most common medicinal herb in the gardens that were surveyed, and traditionally it was boiled with chicken as a seasoning and general tonic. It was used sparingly, however, because a bitter taste resulted if too much was used. Women interviewed reported its use as a remedy for weakness in the arms and legs; leaves were rubbed directly on the affected limbs. *Eupatorium cannibinum*, a related species, has been identified as a home remedy for dropsy (Uphof 1968). Although the use of *Eupatorium lindleyana* is documented in the Southeast Asian medicinal plants literature (Perry 1980), to our

knowledge, it has not been mentioned previously in other Hmong botanical studies.

Dendranthema indicum, cultivated by six of the ten women interviewed, was prepared very similarly to *Eupatorium lindleyana*. It is used as a seasoning for chicken, and when cooked in this way, it is considered a strength-producing tonic. Its leaves are finely chopped and steamed with an egg for cough; for bruises, the leaves are prepared as a poultice and applied externally. The use of this species is discussed in the literature under the synonym *Chrysanthemum indicum* (Perry 1978); its use as a circulatory tonic and in poultices for various skin disorders is confirmed.

LESS FREQUENTLY CULTIVATED CROPS

The frequently cultivated crops discussed above were cultivated more or less equally among young and elderly women. However, elderly women more often cultivated the less common crops (Table 1). Among these crops are interesting medicinals, most of which have been reported previously in the literature.

For example, *Acorus gramineus*, a highly fragrant species cultivated by half the women surveyed, is commonly used as a seasoning for chicken, and as part of postpartum diet. When cooked with chicken, it is frequently used in combination with other herbs such as lemon grass (*Cymbopogon citratus*—not vouchered), *Eupatorium lindleyana*, *Gynura* aff. *procumbens*, and unknown Corlett 28/53. *Acorus gramineus*, reportedly, helps to flush "dead blood" from the body, so that the new mother will be healthier. Postpartum dietary use of this species has been recorded among Hmong in Minnesota (Spring 1989). Other sources list it as a stomachic (Anderson 1986, 1993; Perry 1978), although this use was not confirmed by Hmong women interviewed in the present study.

Sedum aff. *spectabile* was also grown by half the women as a seasoning for chicken as well as a medicine for sores or upset stomach. For treatment of sores, the leaves are pounded into a pulp and placed on the wound. For upset stomach the leaves are decocted and drunk. The use of *Sedum spectabile* to treat abscesses has been reported previously by Duke and Ayensu (1985a). The women in this study said that the leaves were eaten as food in Laos and that the plant was so plentiful, the leaves also were fed to their pigs.

The plant identified as aff. *Angelica* is also used as a seasoning for chicken or cooked with an egg when prepared as a tonic. It is often combined with other herbs such as *Sedum* aff. *sarmentosum* and *Sedum* aff. *spectabile*. When cooked with a freshly killed chicken, these herbs are thought to help a weak person regain strength. A common preparation method to prepare a tonic was to finely chop the leaves, mix with an egg, and then steam the mixture. The patient then consumes the egg with the herbal mixture.

Ceylon spinach (*Basella alba*) was used by the women in this study as a seasoning for chicken, a general tonic, and more specifically for back pain and arthritis. It is often combined with other herbs when cooked with chicken. The broth is consumed, and the leaves themselves, sometimes eaten. Its use as food and as a tonic to promote good health has been recorded among Hmong relocated to Minnesota (Spring 1989). Anderson also noted the use of *Basella alba* for back pain among the Akha and Mien in northern Thailand (Anderson 1986, 1993).

Canna indica (Indian shot), a plant native to the Americas, was introduced to Asia as an ornamental (Perry 1978). *Canna indica* is grown as an ornamental in the Hmong gardens surveyed, selected because of its beautiful flowers and medicinal uses. The leaves are decocted to counter indigestion, stomach ache or cough, and is also used as a tonic when a person feels weak or tired all the time. The leaves are prepared by steaming with an egg. *Canna indica* has been reported in the literature as a remedy for sore throat, although others claim it is without medicinal use (Anderson 1993; Duke and Ayensu 1985a).

Leonorus artemisia (Chinese motherwort) is used by the women in this study for upset stomach and as a tonic. The leaves are decocted and the infusion drunk to treat nausea. For symptoms of weakness, when a person is thin and pale, the leaves are finely chopped, steamed with an egg, and fed to the patient. In the literature, this species has been reported to improve health, circulation, and to regulate menstruation (Duke 1985). Others report that *Leonorus artemisia* stimulates uterine contractions and has been used for centuries in gynecological medicine in Southeast Asia where tradition holds it dispels old blood and improves circulation (Perry 1978).

According to the Hmong women interviewed,

Hydrocotyle javanica (pennywort) is a bitter food. The leaves are finely chopped and steamed with an egg to treat cough. *Hydrocotyle javanica* is listed as both a food and medicinal plant among the Akha of northern Thailand, where it is used as a poultice for cuts and wounds (Anderson 1993).

Among the women surveyed, the leaves of *Achillea millefolium* (yarrow) are either chewed or pounded, and pressed against cold sores or swollen gums. Use of this plant for toothache, ulcers, wounds and as an analgesic and anti-inflammatory is recorded in Asia (Duke and Ayensu 1985a; Uphof 1968).

Polygonum aff. *cymosum* was known by the study participants as an edible wild weed in the forest in Laos. When the Hmong fled the fighting, leaves of this species were used as a food source. They also used it as a treatment for stomach ache, pounding the leaves and applying them externally on the stomach. *Polygonum runcinatum* is used by Sacramento Hmong women to treat heartburn or indigestion. It is prepared in a process called "steam from water," whereby a small quantity of water is put in a hot pan, the leaves added, and the juice drunk. Hmong in Minnesota reportedly use *Polygonum runcinatum* to treat diarrhea, wounds, chicken pox, and pregnancy morning sickness (Spring 1989).

Although often reported as poisonous, the leaves of *Solanum nigrum* are used as food in many places (Anderson 1993; Bailey 1949; Duke 1985; Duke and Ayensu 1985b; Fackelmann 1993; Spring 1989), and their bitter taste is particularly enjoyed by the elderly Hmong interviewed. The Hmong name for nightshade, *zaub ab* in the Green Hmong dialect and *zaub iab* in the White Hmong dialect, both translate as "bitter vegetable." Curiously, *Solanum nigrum* is not documented as food in one of the primary lists of Laotian species (Vidal and Lemoine 1970).

A wide variety of other minor crops that we did not voucher were represented in the garden plots surveyed. These included foods such as cabbage (*Brassica oleracea*), bell peppers (*Capsicum frutescens*), melons (*Citrullus* sp.), and zucchini squash (*Cucurbita pepo*). Bell peppers and zucchini were crops new to the women since arriving in California. Bell peppers (*Capsicum frutescens*) were used as seasoning for various dishes, especially fish. The fruits were sliced, stir-fried or broiled until soft. Seeds were either

purchased at "American stores," or bell peppers were bought at local farmer's market and the seeds saved. One Hmong woman interviewed was introduced to zucchini (*Cucurbita pepo*) by a Fijian woman who gardened next to her plot; she liked the taste and asked for seeds to plant in her own garden. A second Hmong woman who grew zucchini obtained seeds from an "American store"; both women prepared zucchini as stir-fry.

CONCLUSIONS

All the Hmong women interviewed for this study wanted fresh, familiar produce for their families. Although many of the same crops could be purchased at Asian markets in Sacramento, the women thought it easier, more convenient, and more economical to grow their own. Raising foods and herbs are familiar activities for the Hmong women in this study. For many younger Hmong women, however, raised in refugee camps in Thailand, this was their first experience with their own garden. The younger women in the study had learned from their parents and grandparents, and continued as adults to learn from women who gardened with them side-by-side in the urban plots.

After their arrival in Sacramento, the elderly Hmong women in this study often sat alone in their apartments; none spoke English and all reported difficulties in understanding American culture and the changes forced upon them after relocation. Urban gardening, however, provided an opportunity and a place where their skills could be productive and valued. For those who took advantage of the opportunity, tending gardens structured their time, and provided a sense of accomplishment, as they grew their own produce, and supplied their children, grandchildren, and families with food. Such activities clearly served as counterweights to combat feelings of overdependence and uselessness.

The women in the present study, most unrelated by kinship, were bound by a common ethnicity and generously shared their knowledge regarding seeds and cultivation practices. What had begun, initially, as a basis for sharing with other Hmong later extended to sharing with non-Hmong gardeners who also lived and gardened at the same apartment complex.

When the Hmong moved to the United States, they brought familiar foods with them to cultivate in their new home. Although they aban-

done their traditional farming practices and began new lives in urban areas, vacant city lots became small farms, and visible representations of a transplanted culture. The thriving urban gardens in Sacramento, California, ultimately reveal how an uprooted people can begin to adapt to their new country, and in this process, America is enriched.

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