BIBLIOGRAPHIC DATA SHEET	1. CONTROL NUMBER	2. SUBJECT CLASSIFICATION (695)
	PN-AAJ-690	AE30-0000-0000

3. TITLE AND SUBTITLE (240)

Agricultural development : present and potential role of edible wild plants, Part III: India, East Asia, Southeast Asia, Oceania

4. PERSONAL AUTHORS (100)

Crivetti, L. E.

5. CORPORATE AUTHORS (101)

Calif. Univ., Davis.

6. DOCUMENT DATE (110)	7. NUMBER OF PAGES (120)	8. ARC NUMBER (170)
1981	225p.	631.54.G872

9. REFERENCE ORGANIZATION (130)

Calif.--Dav

10. SUPPLEMENTARY NOTES (500)

(Part I, Central and South America : PN-AAJ-688; Part II, Sub-Saharan Africa : PN-AAJ-689)

11. ABSTRACT (950)

12. DESCRIPTORS (920)

Agricultural development
India
East Asia
Southeast Asia
Oceania
Plants
Food supply
Diets
Wild plants

13. PROJECT NUMBER (150)

14. CONTRACT NO.(140)
AID/OTR-147-80-87

15. CONTRACT TYPE (140)

16. TYPE OF DOCUMENT (160)

AID 590-7 (10-79)

PN-AAJ-600

AGRICULTURAL DEVELOPMENT: PRESENT AND POTENTIAL ROLE OF EDIBLE WILD PLANTS

PART III

INDIA, EAST ASIA, SOUTHEAST ASIA, OCEANIA

February, 1981

REPORT TO THE DEPARTMENT OF STATE

AGENCY FOR INTERNATIONAL DEVELOPMENT

AID/OTR-147-80-87

AGRICULTURAL DEVELOPMENT: PRESENT AND POTENTIAL ROLE OF EDIBLE WILD PLANTS

PART 3

INDIA, EAST ASIA, SOUTHEAST ASIA, OCEANIA

by

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1981

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INTRODUCTION

Before domestication of plants and animals all humans lived as hunter-gatherers. The agricultural revolution, first in China and Southeast Asia at least 20,000 years ago, radically altered human economic systems and food patterns, permitting the development of agricultural, pastoral, and ultimately urban societies. While domesticated plants allowed expansion of human activities, with associated social and technological developments, domestication also initiated a basic human nutritional paradox. As reliance upon domesticated foods increased, dietary diversity and food selection diminished -- as food selection has diminished, the probability that all essential nutrients can be obtained from the diet has also diminished.

While principal efforts in agricultural development, heretofore, have been directed toward improving productivity -- not the diversification of domesticated plants and animals -- a major question may be posed: can nutritionally important wild plants offer a legitimate focus for development research? Recent reports by Doughty (1979a; 1979b), National Research Council/National Academy of Sciences (1975; 1979), Nietschmann (1971), Pirie (1962; 1969a; 1969b), Robson (1976), von Reis (1973), and Wilkes (1977) suggest that substantial economic and nutritional gains can be achieved by increasing dietary utilization of wild plants.

Such suggestions form the objective of this report, to explore the role wild plants already play in human diet in Asia, specifically India, East Asia, Southeast Asia, and within Oceania. To accomplish this objective three goals are established: 1) document dietary uses for wild plants, using published accounts of the past 150 years, 2) identify the relative dietary-nutritional importance of selected species, and 3) examine the research potential for such species within the context of agricultural development as part of existing USAID themes of improving agriculture and nutrition in Third World nations.

Basic study questions associated with these objectives may be identified. In regions or societies where wild plants are used as human food, are the plants central or peripheral to maintaining dietary quality? Is their use seasonally important, or is utilization common throughout the agricultural year? Do wild species complement or duplicate energy and nutrients obtained from domesticated field crops? What role do wild plants have in maintaining nutritional quality of diet during drought and periods of associated social unrest? Should research on dietary wild plants be sponsored directly by USAID within the context of agricultural development, or should such research be assigned a low USAID priority?

METHODS

This contract, awarded September 1980, was designed for library research only; no field surveys or correspondence with appropriate governmental agencies were initiated due to time and financial constraints. Four assistants trained in library research-retrieval methods were employed to assist the principal investigator. One computer literature-retrieval search was coordinated using DIALOG/AIRS systems available through the Peter J. Shields Library, University of California, Davis. This system, drawing from a publication data base exceeding 12 million articles is a cross-tabulation process whereby key words associated with wild plant use in diet were matched with respective countries of Asia (Appendix 1). The literature search using the DIALOG/AIRS system was disappointing, yielding less than twenty suitable references. Accordingly, a standard literature search on dietary wild plants was initiated using the methodology outlined in Table 1. Basic anthropological, botanical, geographical, medical, nutritional, and sociological journals appropriate to each country were scanned for the years 1975-1980. Any journal containing one article appropriate to the topic of human utilization of wild plants as food during the most recent five years was scanned chronologically to volume 1; if no suitable article appeared within the survey period, the journal was not further inspected.

Each article identified was read, reference cards prepared, and coded for region, country, ethnic group, and specific plants utilized. Information was summarized on index cards to permit rapid assembly of data. Data presented in subsequent sections of this report are arranged by general region, then by specific reports on plant use within each country. The accounts are diverse and date of publication is not the criterion of quality; some accounts are merely passing reference to human dietary use of wild plants while others provide detailed botanical documentation by Latin terminology. Still others give nutritional information on vitamins and minerals by plant species.

Following the presentation of information on wild plant use as human food in India, East Asia, Southeast Asia, and Oceania, will be a summary and recommendations.

WILD PLANTS AS HUMAN FOOD IN ASIA

Introduction to the Region and Theme

The question of food production within the tropics and the interrelationships between domesticated and wild species has long attracted botanists and social scientists (Anderson, 1952; Zhukovsky, 1964). At first inspection it appears easy to distinguish wild from domesticated species; cultivated from uncultivated; dietary from non-dietary species. On close examination, however, these semantical boundaries become blurred. Numerous wild plants are carefully cultivated; former domesticated species may dot long abandoned human settlements; and many medicinal plants are ingested, providing important nutritional returns. Thus, any approach to understanding the interrelationships between dietary roles of wild or domesticated species must be carefully documented, especially given the long historical-archaeological history of plant use exhibited throughout Asia.

The relationships between cultivated field crops, forest-bush destruction, and dietary use of domesticated and wild food resources are considered in depth by several writers on tropical and Asian agrarian agricultural systems, among them Gourou (1955), Hodge (1958), and Clarke (1976). These accounts, coupled with the efforts of hundreds of anthropologists and geographers, have documented clearly patterns of variation within shifting cultivation systems and address the question whether technological change automatically improves food sufficiency. They note that under tropical conditions shifting cultivation -- a mixed blessing has generally provided substantial quantities of food and permitted maintenance of quality human nutrition.

Other writers have examined Asian foods in the broad sense of documenting both domesticated and wild food resources. Such general works include those by Hendrick (1919) on edible plants of the world; Uphof (1968) on economic plants of the world who identified more than 10,000 species, and provided geographical distribution, dietary use, and method of preparation for each (Appendix 2); Usher (1974) who provided data on more than 15,000 species; and Tanaka (1976) with geographical, dietary data on more than 10,000 wild plants used throughout the world (Appendix 3). Still other authors have focused on specific types of food plants in their work on Asia; Tanaka (1948) on wild and domesticated fruits used throughout the world, Leroy (1968) on tropical fruits, Tewa (1966) on tropical vegetables, and the research on edible wild greens by Oomen (1964), Terra (1964), Martin and Ruberte (1975), and Oomen and Grubben (1978) who have documented the role of edible greens in reducing or eliminating vitamin A blindness within the tropics.

It is the view of this writer, however, that any examination of Asian food systems must consider the processes associated with plant and animal domestication as well as the shift from hunting-gathering to agriculture. Current evidence by Chang (1973; 1977), Solheim (1971), and Gorman (1969) suggests that domestication

of plants first evolved in Asia, specifically in east China. It is further clear that domestication in western Asia was at a much later date than the evidence for China. Social scientists, among them anthropologists, geographers, and historians, have used wild plants, especially dietary plants, in reconstructing human migrations. Lewis (1972) examined the role of fire in the domestication of plants and animals in southwest Asia, while MacDaniels (1947) investigated the Fe'i banana and its distribution within Oceania in attempting to reconstruct human migrations and voyages. Similarly, the work of Simoons (1979) on human diet in Asia has been important in reconstructing historical movements of people and has broad implications for food and dietary relief today.

But for all the research on the ancient, prehistorical dietary patterns of Asians (or of other world regions) a basic paradox remains: why domesticate plants? Harlan (1967) in a classic study conducted in southwest Asia in Turkey documented that an individual could collect 2 pounds of clean wild wheat per hour; within three weeks such effort would be more than an individual could consume in one year. Thus, many anthropologists and geographers have turned from the view that plants were domesticated for food. Why domesticate in the midst of abundant, reliable wild resources? Further studies by Ladizinsky (1975) on collecting wild cereals in the northern Jordan Valley confirms the work of Harlan. Thus, the reasons human societies turned from available, edible wild plants and initiated the processes leading to domestication remain unclear.

Existing in the 20th century and forming a bridge between the archaeological data on wild plants and any understanding of the shift from gathering to plant domestication are numerous Asian societies still living today as hunter-gatherers. These reports will be considered later when examining the wild resources of Australia.

Other writers have considered wild foods throughout the Asian region. Among these have been the reports by Chase (1942) and Zaneveld (1959) on edible marine algae -- a theme that will be considered in detail later. Quisumbing (1953) considered Pandanus tectorius and its dietary role throughout southeast Asia; Young (1954) worked on the flavor qualities of edible Asian bamboo species, noting that the best were Arundinaria simonii var. variegata, Phyllostachys nidularia, Phyllostachys sulphurea var. viridis, Phyllostachys vivax, and Pseudosasa japonica; Soegeng-Reksodihardjo (1963) described the Asian varieties of Durio (species dulcis, grandiflorus, graveolens, kutejensis, oxleyanus, and zibethinus) with high concentrations of vitamin C; while Mann and Stearn (1960) have reported on lesser known plants from China, specifically Allium chinense or Ch'iao T'ou. Copeland (1942) described the edible ferns of Asia with specific reference to Athyrium esculentum, Ceratopteris siliquosa, Dryopteris prolifera, Helminthostachys/spp. and Pteris esculenta. Morton (1962) focused on Spanish needles (Bidens pilosa) as a wild food resource throughout Asia, noting its use as a tea substitute in the Marquesas and extensive dietary role throughout the Philippines. Parham (1938) has worked on wild tamarind (Leucaena glauca) as well as the distribution of Sago throughout the south Pacific (1939).

Augmenting the extensive general works on wild plants and their use throughout Asia are numerous accounts providing chemical, nutritional composition data. The extensive quality of such works contrasts sharply with evidence provided in part 1 (Central and South America and the Caribbean) and part 2 (Sub-Saharan Africa) of this contract. Among the more important sources on nutrient composition are those on Chinese foods by University of Hawaii (1925); data on poi, taro, and limu (seaweed) by Miller (1927); Leung et al. (1972) on food composition for East Asia in general; Miller et al. (1951) on values for the Pacific Islands; Maranon et al. (1954) on specific fruits from the Philippines; Peters (1958) on

the South Pacific; Earle and Jones (1962) on the energy and composition values of edible seeds; Jones and Earle (1966) on the protein and oil composition of more than 750 plant species; Stanton (1966) on the composition of Durian; Gerlorr et al. (1965) on Amino acid composition of leaf protein concentrate; van Etten et al. (1967) on the Amino acid composition of more than 370 species; Engelter and Wohmeyer (1970) on the fatty acid composition of oils of edible seeds of wild plants; and the work by Rao and Delavady (1979) on the chemical composition and biological evaluation of selected indigenous foods of India.

It should also be noted that while most of the accounts in this report stem from tropical Asia, Eidlitz (1969) has produced a unique monograph on the edible plant and animal foods common to Arctic Asia.

India (Map 1)

Archaeologically and historically the foods of India are well documented. Modern botanical accounts also are numerous as evidenced by the monographs on Indian plants by Dastur (1952) who provides more than 1,800 species, many as human food (Appendix 4), and the extraordinary book by Singh and Arora (1978) on the wild edible plants of India with more than 800 wild food plants (Table 2; Appendix 5).

The theme of famine foods is extensive throughout the Indian literature as revealed by the early work of Ryan (1903) who wrote on Dioscorea pentaphylla as consumed by the Kathodis, Thakoors, and Warlis of Thana District, Bombay district. More recent work by Gupta and Kanodia (1968) and Kanodia and Gupta (1968) focused on available famine foods in Rajasthan and the report that more than 86 species were regularly consumed (Table 3); their work recently expanded by Bhandari (1974), identified additional emergency foods used during periods of famine in the same region (Table 4).

MAP 1

INDIA

FIGURE 1 Regional location of tribes in India.

After Sen Gupta (1980)

Other excellent work on edible wild foods include the report by Banerji (1955) on edible plants from east Nepal/India, specifically the root Meconopis nepalensis, algae Prasiola fluviatalis, fruit Rhus parviflora, herb Valeriana wallichii. and various branches from Sambucus adnata and Thermopsis barbata that are made into curry dishes. Vartak (1959) identified more than 60 species of wild, edible plants from Poona district of western Ghats in the Mawal Hills (Table 5). Datta and Banerjee (1978) investigated West Bengali rice fields for "weed" use and found that 124 of 158 species of "weeds" had important economic uses with 48 being edible (Table 6). Jain and Dam (1979) conducted field work in northeastern India and reported 28 wild species commonly used as food (Table 7).

Other studies have integrated botanical accounts with cultural data. Such work is best represented in the publications of Ferro-Luzzi (1974; 1975; 1977) who is the leading cultural-nutrition expert on southern India (Tamilnad). She clearly notes that while wild foods may be used extensively, care must be taken to clearly identify who can and cannot consume specific wild species since many wild foods permitted at one time of the year may be taboo depending upon the physiological condition of the potential consumer (eg. pregnancy, lactation). The work of Pingle (1975) compared the nutritional values provided by wild food resources for two tribal groups, the Koyas and Maria Gonds of Central India, and noted that wild foods provide up to 10% of calories, 25% protein, 85% of calcium, 50% iron, 95% vitamin A, 100 vitamin C, 25-65% of the B-complex vitamins (see Appendix 6). Bedi (1978) conducted field work among the Bhils, Kolis, Patlias, and Ravana societies of the Vindhya and Satpura Mountains of Gujarat, and identified more than 20 species of edible wild plants (Table 8). Roy (1978), writing on the alcoholic beverages of tribal societies of India, noted that numerous types were prepared from wild plants and that they played variable nutritional roles as dietary supplements.

Specific interest in single wild foods found within India has been the work of still other authors. Brahmachari and Chatterjee (1927) worked on the nutritional values of the nut Trapa bispinosa; Stanford (1934) and more recently Davis (1972) were interested in the distribution and use of the wild date (Phoenix sylvestris) in the Ganges valley and its role in local diet; while Subramanyan and Srinivavasan (1952) were early pioneers in the search for food supplements using Amaranthus paniculatus. Chandel et al. (1972) provided data on the nutritional composition of Vigna capensis, a wild edible legume of India, noting it was high in protein, with modest calcium values, but had a better biological nutritional role than four world dietary staples -- manioc (Manihot esculenta), sweet potato (Ipomoea batata), taro (Colocassia esculenta), or yam (Dioscorea spp.). Gupta et al. (1974) worked on another edible, Indian legume, Proscopis cineraria, while Ninan et al. (1977) provided data on wild yams, specifically Dioscorea), of Kerala province. Roy and Singh (1979) considered Aegle marmelos fruit, an Indian species with very high riboflavin content; Ramachandran et al. (1980) focused on Moringa oleifera and Moringa concanensis as promising supplemental foods that are being threatened with extinction through expansion of farm size (see Table 9 for the excellent chemical composition of this wild fruit). Thomas (1980) worked on Artocarpus heterophyllus or jackfruit as a potential important wild fruit, with 6.6% protein.

Numerous studies on nutritional status have been conducted throughout India. Of the many reviewed during preparation of this monograph several struck the author as being especially important. These include the recent work by Sen Gupta (1980) on food consumption and nutritional status of regional tribes of India (Map 1; Table 10) and the early report by Aykroyd and Krishnan (1937) on south Indian diet and their observations of the important role played by Amaranthus gangeticus

in village diet. The classic account of nutrition in India, however, must be attributed to Patwardhan (1952) - - a text that still today is without peer (Dr. V. Patwardhan later became the director of Nutrition, WHO).

The Indian accounts are also detailed in their attention to the nutrient composition of wild and domesticated foods. Ahmad (1935) published the basic vitamin C values of common Indian fruits, vegetables, and legumes, while Ahmad et al. (1937) reported the carotene content of common Bengali foods, providing data on numerous wild, indigenous products but giving only the common, local names (eg. saks, pllta sak, soya sak, lal sak, methi sak, puin sak -- all high in vitamin A). Sundararajan (1938) provided data on phosphorus content of Indian foods while Swaminatnan (1937) reported relative value for protein with high values for Moringa oleifera, Amaranthus gangeticus, Ipomoea reptans, and Solanum melongena. Pant et al. (1974a) report the amino acid composition for wild Indian legumes (Table 11), noting that all have limiting amino acids but are generally high in cystine, methionine, and tryptophan, and thus could be used if balanced and taste processed. Pant et al. (1974b) further investigated wild Indian legumes noting their potential as human food resources (Table 12). Theophilus and Arulanantham (1949) presented data on edible wild green leaves from southern India, noting that of 10 species examined, all were rich in vitamin C, and that Tribulus terrestris and Trianthema monogyna were limiting in iron (Table 13).

Ghosh and Guha (1933) worked on the nutritional values of Indian foods and noted several wild species high in iron (Amarantas spp., Erythroea roxburghii, and Ipomoea reptans), one high in calcium (Bassela cordifolia), and two high in phosphorus (Hibiscus esculentus and Trichosanthes dioica)(Table 14). Ghosh and Guha (1934) continued their work and provided additional data on wild species and concentrations for vitamins A and B-complex (Table 15). Ranganathan et al. (1937) continued this research on more than 200 common Indian foods, both wild

and domesticated (Table 16), while Ranganathan (1938) reported on available iron in common Indian foods, noting that five wild species have relatively high values (Amaranthus gangeticus, Murraya koenigii, Sesbania grandiflora, Solanum nigrum, and Solanum torvum). Joshi and Nigam (1976) report amino acid composition data on wild Indian legumes noting that Cassia tora has 23.2% protein (low in lysine) while Cesalpinia bounducella contains 25.3% protein (low in triptophan).

Nicobar Islands

Mann (n.d.) provides a limited description of wild plant use from the Nicobar Islands, noting that the residents consume cycads, Pandanus leram, and numerous wild yams.

Thailand

Hauch and Sudsaneh (1959) describing dietary intake and nutritional status in Thailand noted that 75% of the vitamin A may come from leafy vegetables, many of them wild (not identified to species). Kunstadter (1978) writing on Lua farmers in northwestern Thailand mentions that more than 182 wild plants were used and of these 103 were regularly collected in fallow swidden sites, the more commonly consumed being Alpinia galanga, Anisochilus siamensis, Asparagus filicinus, Cinnamomum subavenium, Cinnamomum tamala, Curcuma longa, Dioscorea alata, Dioscorea pentaphylla, Piper spp., and Scleropyrum wallichianum.

Laos/Indochina

A brief account by Izikowitz (1951) on the Lamet, a hill peasant society, mentions extensive use of edible wild plants (none identified to species). The classic work on Laotian wild edible plants, however, stems from the monograph by Vidal (1956) (see Appendix 7). Roberts et al. (1967) mentions extensive use of edible wild plants during periods of crop failure, while Gerhold (1967) provides a basic overview of Laotian diet, noting use of edible wild species but giving few specifics.

TABLES 1 - 16 FOLLOW

TEXT RESUMES ON PAGE 34

TABLE 1. LIBRARY RESEARCH ORGANIZATIONAL PLAN

TOPIC
(Dietary Use of Wild Plants)

STUDY REGIONS:

1) Central America, South America, Caribbean
2) Sub-Saharan Africa
3) India, East Asia, Southeast Asia, Oceania

TIME CONSTRAINT: THREE WEEKS PER EACH REGION FOR LIBRARY RESEARCH

PERSONNEL ASSIGNMENTS

Research Assistant 1:	references concerning anthropology and geography by study region
Research Assistant 2:	references concerning botany by study region
Research Assistant 3:	references of medical-nutritional content by study region
Research Assistant 4:	references of a regional nature that contain botanical, cultural, or medical-nutritional information

LITERATURE SOURCES

1. General journals (multi-disciplinary)
2. General books (multi-disciplinary)
3. Specific journals (by discipline, study region, and country)
4. Specific books (by discipline, study region, and country)
5. Bibliographies (by discipline, study region, and country)
6. Dissertations/Theses (by discipline, study region, and country)
7. Abstract services (by discipline): Anthropology Abstracts; Food Science Abstracts; Geographical Abstracts; Nutrition Abstracts; World Agriculture, Economics, and Sociology Abstracts
8. Current Contents (natural sciences and social sciences)
9. Science Citation Index (examination by key word; key word selected by topic, sub-theme, region, and country)
10. Index Medicus (examination by key word; key word selected by topic, sub-theme, region, and country)

Table 2. Nutritive Values of Some Wild Edible Plants of India (Singh and Arora, 1978)

TABLE 1. NUTRITIVE VALUES OF SOME WILD EDIBLE TUBEROUS TYPES

Species	Moisture	(% dry basis) Minerals	Fat	Carbohydrates	fibre	ash
[illegible]	8.5	7.7	1.4	65.9	8.9	7.6
[illegible]	7.6	3.8	1.6	76.0	6.1	5.1
[illegible]	5.2	3.4	3.3	[illegible]	12.6	9.4
[illegible]	—	9.7	1.3	77.8	3.9	5.8
[illegible]		10.1	1.4	78.2	5.0	6.7
[illegible]		8.3	0.8	[illegible]	1.5	3.9
[illegible]	—	7.2	0.9	81.4	3.3	4.0
[illegible]		9.1	1.1	81.9	6.3	4.6
[illegible]	—	11.7	1.5	[illegible]	6.5	8.7
[illegible]	—	11.4	0.5	74.1	2.9	3.7
[illegible]	—	12.1	1.1	81.1	3.4	4.3
[illegible]	—	6.4	—	[illegible]	10.0	10.3
[illegible]	4.2	11.5	0.4	67.5	3.4	7.3
[illegible]	—	10.9	0.5	[illegible]	23.4	—
[illegible]*	76.5	3.4	0.2	18.9	—	—

Data compiled from The Wealth of India.
*Chandel, K.P.S., Arora, R.K., and Joshi, B.S. *Curr. Sci.* 41(14): 537

TABLE 2. NUTRITIVE VALUES OF SOME WILD LEAFY EDIBLE TYPES

Species	Moisture%	Protein%	Fat%	Carbohydrates%	Mineral matter%	Ca%	P%	Fe mg/100g	Fibre%	ash%
[illegible] (under [illegible])	85.8	4.9	0.5	5.7	3.1	0.5	0.1	21.4	—	—
[illegible] (plant)	85.0	3.0	0.3	8.1	3.6	0.8	0.05	22.9	—	—
[illegible] (dry plant)	13.1	12.8	1.0	31.6	—	—	—	—	13.6	18.2
[illegible] (fresh twigs)	83.41	3.64	1.85	—	—	0.88	0.07	21.45	—	37.5
[illegible] (fresh)	93.4	0.3	0.3	4.1	1.2	0.06	0.02	0.5	0.6	—
[illegible] (fresh [illegible])	90.3	2.9	0.4	4.3	2.1	0.11	0.05	3.9	[illegible]	—
[illegible] (dry plant)	16.13	15.56	2.4	35.12	8.8	1.62	0.55	—	2.78	0.01
[illegible] (leaves [illegible])	9.22	22.25	7.32	41.14	1.13	—	—	—	13.63	—
[illegible] (fresh)	20.8	5.1	1.7	—	2.3	—	—	—	3.9	—
[illegible]	56.4	1.7	0.7	5.1	2.3	—	—	—	3.9	—
[illegible]	81.6	1.9	0.3	10.2	3.5	—	—	—	3.5	—
[illegible]	32.6	3.0	0.8	7.9	2.4	—	—	—	3.2	—
[illegible]	—	11.5	0.9	40.2	13.6	—	—	—	33.8	—
[illegible]	83.2	3.2	0.7	6.9	3.9	—	—	—	2.1	—

Data compiled from Aykroyd (1956) and The Wealth of India

TABLE 3. NUTRITIVE VALUES OF SOME WILD EDIBLE FRUITS

Species	Moisture	Proteins	fat	Minerals	Fiber	Carbohydrates	Calories
			(per 100 gm of edible portion)				
[illegible]	61.5	1.8	0.3	1.7	2.9	31.8	137
[illegible]	82.1	0.7	1.1	0.3	2.0	13.3	[illegible]
[illegible] (dry)	18.2	2.3	9.6	2.3	—	67.1	364
[illegible]	82.5	1.5	1.0	2.2	0.3	[illegible]	63
[illegible]	77.2	0.7	0.4	0.5	1.5	19.5	—
[illegible]	81.2	0.5	0.1	0.7	3.1	14.1	—
[illegible]	[illegible]	2.8	1.1	0.9	2.3	[illegible]	329
[illegible]	64.2	7.1	3.7	1.9	5.0	13.1	[illegible]
[illegible]	[illegible]	1.7	1.3	1.3	4.7	22.7	135
[illegible]	13.5	8.7	5.7	9.0	13.7	43.1	114
[illegible]	12.9	8.1	6.1	7.7	31.3	35.5	—
[illegible]	46.9	3.7	3.7	1.9	[illegible]	35.0	—
[illegible]	[illegible]	1.2	0.4	1.7	3.7	[illegible]	133
[illegible]	81.7	1.0	0.2	0.7	3.3	12.5	164
[illegible]	[illegible]	0.6	0.2	0.4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0.5	0.3	0.3	1.0	3.5	47
[illegible]	[illegible]	0.7	3.0	0.5	1.0	[illegible]	19
[illegible]	81.7	0.7	0.3	0.4	0.9	14.0	47
[illegible]	79.5	0.8	0.6	0.3	1.3	16.5	62
[illegible]	53.3	3.2	1.3	2.0	4.0	33.3	155

Data compiled from Aykroyd (1956) and The Wealth of India.

Table 3. Plants Used During Scarcity and Famine Periods in Arid Regions of India (Gupta and Kanodia, 1968; Kanodia and Gupta, 1968).

Latin Terminology	Portion Used
Cocculus hirsutus	Leaves; as vegetable
Clome viscosa	Leaves; as vegetable
Portulaca oleracea	Leaves; as vegetable
Portulaca quadrifida	Leaves; to make bread
Abutilon indicum	Seeds; alone or as a beverage
Bombax ceiba	Roots; roasted and eaten, Leaves; as a condiment, Flowers; to make bread
Grewia tenax	Fruit, Leaves; as a vegetable
Oxalis corniculata	Leaves; as vegetable
Azadirachta indica	Fruits
Zizyphus mauritiana	Fruits
Zizyphus nummularia	Fruits
Zizyphus truncata	Fruits
Cardiospermum halicacabum	Fruits; Leaves and shoots as vegetable
Rhus mysorensis	Leaves and Fruits
Moringa pterygosperma	Flowers; Pods
Alysicarpus rugosus	Seeds
Butea monosperma	Roots
Indigofera cordifolia	Seeds
Indigofera linifolia	Seeds; Fruits
Phaseolus trilobus	Pods; Seeds
Sesbania aegyptiaca	Seeds
Sesbania grandiflora	Leaves; Flowers; Pods as vegetable
Cassia occidentalis	Leaves as vegetable
Cassia tora	Leaves as vegetable
Tamarindus indica	Fruit; Seeds; Leaves
Acacia leucophloea	Pods as vegetable; Bark
Acacia nilotica indica	Seeds; Pods as vegetable
Acacia senegal	Seeds
Prosopis cineraria	Pods; Seeds; Bark; Leaves
Opuntia nigricans	Fruits
Cucumis callosus	Fruits
Coccina grandis	Fruits
Citrullus lanatus	Pulp; Seeds
Citrullus colocynthis	Seeds; Fruits
Momordica dioica	Fruits
Trianthema monogyna	Leaves used as vegetable
Zaleya govindia	Leaves as vegetable
Launaea pinnatifida	Leaves as vegetable
Madhuca indica	Flowers; Fruits; Fruit
Diospyros montana	Fruits; Bark
Carissa spinarum	Fruits
Ceropegia bulbosa	Tubers; Leaves
Cordia dichotoma	Fruits; Leaves

TABLE 3 (CONTINUED)

Cordia gharaf	Fruits
Rivea hypocrateriformis	Leaves
Ipomoea aquatica	Leaves; Shoots
Solanum nigrum	Leaves; Fruits
Lantana camara	Fruits
Ocimum americanum	Seeds
Leucas cephalotes	Leaves
Boerhavia diffusa	Leaves
Achyranthes aspera	Leaves
Amaranthus gracilis	Leaves
Amaranthus hybridus cruentus	Leaves; Seeds
Amaranthus spinosus	Leaves
Celosia argentea	Leaves
Digera muricata	Leaves; Flowers
Chenopodium album	Leaves
Haloxylon salicornicum	Seeds
Acalypha indica	Leaves
Securinega leucopyrus	Leaves
Ficus benghalensis	Fruits
Ficus racemosa	Fruits
Musa paradisiaca	Stem
Aloe barbadensis	Pith; Pulp
Dioscorea pentaphylla	Tubers
Dioscorea sativa	Tubers
Asparagus racemosus	Roots
Chlorophytum tuberosum	Bulbs; Leaves
Commelina benghalensis	Leaves; Seeds
Commelina forskalaei	Leaves; Seeds
Cyanotis axillaris	Seeds
Phoenix sylvestris	Leaf; Stem; Fruit
Borassus flabellifer	Roots; Fruits; Leaf; Sap
Cyperus bulbosus	Bulbs
Scirpus maritimum	Seeds
Brachiaria ramosa	Seeds
Cenchrus setigerus	Seeds
Cenchrus biflorus	Seeds
Dactylocentium aegyptium	Seeds
Echinochloa colonum	Seeds
Echinochloa crusgalli	Seeds
Panicum flavidum	Seeds
Panicum antidotale	Seeds
Panicum turgidum	Seeds
Bambusa arundinacea	Seeds; Shoots

Table 4. Famine Foods in the Rajasthan Desert (Bhandari, 1974)

Latin Terminology	Portion Used
Prosopis cineraria	Pods; Bark; Gum
Cenchrus biflorus	Seeds
enchrus setigerus	Seeds
Calligonum polygonoides	Buds
Lasiurus hirsutus	Seeds
Dactylocenium sindicum	Seeds
Citrullus colocynthis	Seeds
Dactylocenium aegyptium	Seeds
Citrullus lanatus	Pulp; Seeds
Acacia jacquemontii	Gum
Acacia leucophloea	Bark; Seeds; Pods
Zizyphus nummularia	Fruits
Zizyphus mauritania	Fruits
Sorghum halepense	Seeds
Tribulus terrestris	Fruit; Seeds
Indigofera cordifolia	Seeds
Indigofera linifolia	Seeds
Tamarindus indica	Seeds; Fruit
Acacia nilotica indica	Seeds; Gum; Bark
Capparis decidus	Fruit; Flower; Flower
Salvadora oleoides	Fruit
Achyranthes aspera	Seeds
Eleusine coracana	Seeds
Sesamum indicum	Seeds; Chaff
Cyperus rotundus	Roots

Table 5. Edible Wild Plants From the Hilly Region of the Poona District, Bombay State (Vartak, 1959)

Latin Terminology	Portion Used
Nymphaea pubescens	Roots; Fruit; Seeds
Capparis zeylanica	Fruits
Portulaca oleracea	Leaves; Stem
Garcinia indica	Fruit
Salmalia malabarica	Flower; Buds; Fruits
Grewia abutifolia	Fruits
Zizyphus mauritiana	Fruits
Zizyphus rugosa	Fruits
Rhus mysurensis	Fruits
Buchannia lanzan	Fruits
Indigofera pulchella	Flower; Buds
Smithia conferta	Leaves
Phaseolus khandalensis	Seeds
Phaseolus radiatus	Seeds
Vigna capensis	Roots; Seeds
Cassia tora	Leaves
Acacia arabica	Gum
Terminalia bellerica	Seeds
Anogeissus latifolia	Gum
Syzygium cumini	Fruits
Momordica dioica	Fruits
Cucumis melo agrestis	Fruit
Melothria heterophylla	Fruits
Meyna laxiflora	Fruit
Launaea nudicaulis	Leaves
Mimusops elengi	Fruits
Diospyros melanoxylon	Fruit
Jasminum malabaricum	Fruit
Carissa congesta	Fruit
Wrightia tinctoria	Flowers
Holostemma annularis	Flowers
Ceropegia lawii	Tubers
Ceropegia hirsuta	Tubers
Ceropegia oculata	Tubers
Caralluma fimbriata	Leaf; Stem
Cordia dichotoma	Leaves; Fruit
Ipomoea aquatica	Shoots; Leaves; Roots
Solanum indicum	Fruit
Clerodendrum serratum	Flowers
Gmelina arborea	Fruit
Celosia argentea	Leaves
Amaranthus spinosus	Leaves
Amaranthus polygamus	Stem; Leaves
Aerva sanguinolenta	Leaves
Elaeagnus conferta	Fruit
Ficus glomerata	Fruit

TABLE 5 (CONTINUED)

Latin Terminology	Portion Used
Curcuma pseudomontana	Tuber
Ensete superbum	Fruits; Buds
Dioscorea pehtaphylla	Flower; Buds
Dioscorea oppositifolia	Tubers
Smilax zeylanica	Branches; Leaves
Chlorophytum tuberosum	Leaves
Chlorophytum spp.	Leaves
Ariopsis peltata	Leaves
Remusatia vivipara	Leaves
Phoenix sylvestris	Fruits
Bambusa bambos	Seed; Shoots
Lastrea felix-mass cochleata	Leaves
Lycoperdon spp.	Puff-Ball
Agaricus spp.	Mushroom; Cap; Stem

Table 6. Useful Weeds of West Bengal Rice Fields (Datta and Banerjee, 1978)

Latin Terminology	Portion Used
Aponogeton natans	Roots
Ottelia alismoides	Fruits; Leaves
Coix lacryma-jobi	Seeds
Echinochloa colonum	Seeds
Eleusine indica	Seeds
Imperata cylindrica	Root made into beer
Ischaemum rugosum	Seeds
Leptocholoa chinensis	Seeds
Oplismenus burmannii	Crushed; made into medicinal extract
Panicum psilopodium	Seeds
Panicum trypheron	Seeds
Paspalidium flavidum	Seeds
Paspalum scorbiculatum	Seeds
Setaria glauca	Seeds
Urocholoa helopus	Seeds
Scirpus grossus	Tubers
Commelina diffusa	Leaves
Polygonum plebejum	Leaves
Achyranthes aspera	Leaves
Alternanthera sessilis	Leaves
Amaranthus gracilis	Leaves
Celosia argentea	Leaves
Digera alternifolia	Leaves; Flower; Seeds
Glinus lotoides	Shoots
Glinus oppositifolius	Leaves; Stems
Portulaca oleracea	Shoots
Polycarpon prostratum	Leaves
Nymphaea stellata	Leaves; Flowers; Tubers; Seeds
Polanisia viscosa	Seeds; Leaf
Aeschynomene aspera	Leaves
Desmodium triflorum	Leaves
Sesbania cannabina	Seeds
Smithia sensitiva	Leaves
Melochia corchorifoia	Leaves
Centella asiatica	Leaves
Nymphoides cristatum	Leaves; Stems; Fruits
Ipomoea aquatica	Shoots; Roots
Merremia emarginata	Leaves
Hydrolea zeylanica	Leaves
Phyla nodiflora	Leaves
Leucas cephalotes	Leaves
Limnophila indica	Leaves
Borreria articularis	Leaves; Seeds; Root
Lobelia alsinoides	Leaves
Sphenoclea zeylanica	Leaves
Eclipta prostrata	Leaves

TABLE 6 (CONTINUED)

Latin Terminolgy	Portion Used
Enhydra fluctuans	Leaves
Gnaphalium indicum	Leaves

Specifically noted as Famine Foods by Authors

Aeschynomene aspera
Alternanthera sessilis
Amaranthus gracilis
Coix lachryma-jobi
Echinocloa colonum
Glinus lotoides
Ipomoea aquatica
Leptochloa chinensis
Polycarpon prostratum
Ottelia alismoides
Setaria glauca

Table 7. Edible Wild Plants from Northeastern India (Jain and Dam, 1979)

Latin Terminology	Portion Used
Acanthopanax trifoliatus	Shoots
Antidesma dianirum	Fruits; Leaves
Begonia palmata	Leaves
Begonia rubrovenia	Stem
Buddleja asiatica	Leaves
Buddleja macrostachya	Bark
Cardamine macrophylla	Leaves
Casearia graveolens	Leaves; Twigs
Cirsium involucratum	Seeds; Shoots
Cleome viscosa	Seeds
Codonopsis parviflora	Leaves
Crataeva nurvala	Shoots; Fruits
Croton roxburghii	Leaf
Cyathocalyx martabanaicus	Fruit
Elaeocarpus floribundus	Fruits
Elatostema dissectum	Leaves; Fruits
Ficus auriculata	Sprouts; Fruits
Ficus prostrata	Bark; Fruits
Garcinia cowa	Fruit
Gaultheria nummularioides	Fruit
Gnetum montanum	Seeds
Piper diffusum	Fruit
Potentilla fulgens	Root
Uvaria hamiltonii	Pulp
Zanthoxylum acanthopodium	Fruit
Zanthoxylum armatum	Fruit
Zanthoxylum limonella	Leaves

Table 8. Edible Wild Plants of the Ratan Mahal Hills, Gujarat, India (Bedi, 1978)

Latin Terminology	Portion Used
Hibiscus sabdariffa	Flower
Grewia hirsuta	Fruit
Celastrus paniculatus	Flower
Schleichera oleosa	Fruit
Abrus precatorius	Leaf
Macuna prurita	Seed
Randia uliginosa	Fruit
Madhuca longifolia latifolia	Bark; Leaf
Holarrhena antidysenterica	Plant latex
Tylophora fasciculata	Fruit
Ceropegia bulbosa	Root
Ehretia laevis	Fruit
Gmelina arborea	Fruit
Ocimum gratissimum	Seed; Root
Leucas stricta	Leav
Boerhavia diffusa	Root; Leaf
Musa rosacea	Fruit; Seed
Tacca leontopetaloides	Tuber
Dioscorea bulbifera	Tuber
Dioscorea pentaphylla	Tuber
Asparagus racemosus javanica	Root
Chlorophytum tuberosum	Root
Arisaema murrayi	Fruit

Table 9. Nutritional Composition of Drumbstick (Moringa oleifera): A Multipurpose Indian Vegetable (Ramachandran et al., 1980)

TABLE 1. COMPOSITION OF LEAVES AND FRUITS (PER 100 G OF EDIBLE PORTION).[a]

	Leaves	Fruits
Edible portion (%)	75	83
Moisture (%)	75.0	86.9
Protein (g)	6.7	2.5
Fat (g)	1.7	0.1
Carbohydrate (g)	13.4	3.7
Minerals (g)	2.3	2.0
Fibre (g)	0.9	4.8
Calories	92	26
Calcium (mg)	440	30
Magnesium (mg)	24	24
Oxalic acid (mg)	101	101
Phosphorus (mg)	70	110
Potassium (mg)	259	259
Copper (mg/g)	1.1	3.1
Iron (mg)	7	5.3
Sulphur (mg)	137	137
Vitamin A (I.U.)	11,300	184
Choline (mg)	423	423
Thiamine (mg)	0.06	0.05
Riboflavin (mg)	0.05	0.07
Nicotinic acid (mg)	0.8	0.2
Vitamin C (mg)	220	120

[a] Wealth of India, 1962; Aykroyd, 1966

TABLE 2. PROTEIN FRACTIONS OF LEAVES AND FRUITS (G/16G N).[a]

	Leaves	Fruits
Arginine	6.0	3.6
Histidine	2.1	1.1
Lysine	4.3	1.5
Tryptophan	1.9	0.8
Phenylanaline	6.4	4.3
Methionine	2.0	1.4
Threonine	4.9	3.9
Leucine	9.3	6.5
Isoleucine	6.3	4.4
Valine	7.1	5.4

[a] Wealth of India, 1962

Table 10. Nutritive Value of Wild and Domesticated Foodstuffs Used by Selected Indian Tribes; Nutritive Value of Selected Samples of Home Brewed Tribal Alcoholic Beverages Prepared from Domesticated and Wild Plants (Sen Gunta, 1980)

TABLE VIII

Nutritive value of some foodstuffs used by selected Indian tribes. (Amounts per 100 g of food).

Tribal name	Source	Botanical name	Energy Cals.	Energy kJ.	Protein (g)	Calcium (mg)	Iron (mg)	Vitamin A retinol equiv. (μg)	Thiamine (mg)	Niacin (mg)	Ascorbic acid (mg)
Amkel	Red rice	*Oryza Sativa*	356	1.496	8.4	37	20.0	-	0.32	1.7	-
Annyat		*Coix Lacryma*	356	1.469	8.5	25	26.7	—	—	1.7	—
Ayyak	Millet	*Setaria italica*	349	1.460	9.0	12	19.8	475	—	2.3	—
Namdung	Millet	*Perilla Ocimoides*	373	1.561	18.2	36	20.1	—	—	5.0	—
Mirung	Millet	*Eleusine-coracana*	369	1.544	8.6	15	14.8	305	0.42	4.5	—
Kondhan	Millet	*Pennisetum typhoideum*	356	1.489	9.1	30	4.4	—	0.58	1.8	—
Ragi	Millet	*Eleusine-coracana*	345	1.443	9.1	24	5.5	325	0.45	0.4	—
Sappa	Maiz	*Zea mays*	340	1.426	11.2	10	2.1	358	—	4.8	—
Vattachi	Rice	*Oryza Sativa*	358	1.498	8.4	10	2.4	—	0.22	2.8	—
Lauri	Wild leaf	*Petroscinum crispum*	88	368	4.8	13	19.5	1.610	—	2.8	59.6
Ogen	Wild leafy vegetable		42	176	3.8	36	14.4	1.316	—	6.3	26.3
Morchang	Wild leafy vegetable		50	209	2.9	20	8.7	2.065	—	3.5	33.4
Pattu	Rape leaf	*Brassica napus*	71	297	6.7	20	10.3	1.515	—	4.2	53.4
Achaga	Vegetable, green		92	385	8.0	36	8.5	1,012	0.12	1.4	—
Mushblai	Wild vegetable	*Cappares horrida*	103	431	4.0	46	31.0	641	0.24	—	—
Singatha	Leafy vegetable		70	293	4.8	12	9.0	692	—	0.4	—
Enge	Colocasia	*Colocasia antiquorum*	33	145	3.1	400	2.0	32	0.09	0.4	—
Noran	Tapioca	*Manihot esculenta*	89	378	0.8	50	0.9	—	—	—	—
Neduman	Wild root	*Colocasia spp.*	71	297	1.7	10	1.3	—	—	—	—
Brau	Tuber	*Dioscorea spp*	111	464	3.8	40	1.5	—	0.23	—	—
Kavala	Keranga wild root	*Dioscorea Versi*	79	331	2.0	10	0.9	—	0.36	0.7	—
Piar	Wild bean	*Glycin hispida*	349	1.463	5.1	10	4.0	48	0.18	2.0	—
Khakli	Red gram	*Cajanus cajan*	101	423	5.7	75	8.3	134	0.43	—	—
Mukhmoi	Mushroom	*Agaricus campestris*	44	184	2.6	9	5.6	—	0.19	—	—
Adin	Meat	*Bos frontalis*	290	1.213	16.6	15	2.9	15	0.34	4.8	—
Adin	Venison	*Antilope cervicapra Lin*	178	745	29.6	30	7.7	—	0.62	0.55	—
Adin	Pork	*Sus crofatus Wagner*	336	1.410	15.4	90	2.2	Tr.	0.94	3.8	—
Enga	Fish, smoked	not identified	406	1.700	72.6	1.500	16.3	—	—	—	—
Mahai	Fish, dried	*Salmo spp*	296	1.239	55.2	102	48.2	—	3.62	—	—
Suri	Fish, dried	*Arius arius*	345	1.443	70.1	775	11.9	—	—	—	—

Table 10 (CONTINUED)

Nutritive value of selected samples of home brewed tribal alcoholic drinks (amounts per 100 ml).

Tribal name	Source	Botanical name	Alcohol by vol.	Energy Cals.	Energy kJ	Protein (g)	Calcium (mg)	Iron (mg)	Thiamine (μg)	Riboflavin (μg)	Niacin (mg)
Apong	Red rice	*Oryza Sativa*	5.4	62	259	0.3	6.0	0.7	0.03	2.8	0.5
Apong	Mirung	*Eleusine-Coracana*	5.1	65	271	1.0	9.2	1.2	—	1.4	0.5
Poka	Rice	*Oryza Sativa*	6.2	55	230	0.6	9.6	0.4	0.04	2.6	0.6
Kham	Konidhan	*Pennisetum Ocimoides Linn.*	7.0	53	221	0.5	3.5	0.9	0.09	9.0	1.0
Choowak	Rice	*Oryza Sativa*	6.8	59	246	1.4	10.6	0.4	0.03	2.5	2.4
Pakhoi	Barley	*Hordeum vulgare*	8.0	76	318	0.3	19.6	2.6	0.05	2.3	4.0
Diang	Rice	*Oryza Sativa*	3.8	38	159	0.7	3.5	1.9	11.7	25.2	0.4
Diang	Rice	*Oryza Sativa*	4.3	42	178	0.9	1.2	1.9	16.7	16.8	0.4
Tadi	Sago-palm	*Metroxvion Sago*	1.6	18	75	0.7	0.5	0.7	11.5	0.7	0.5
Salapa	Palm juice	*Borassus auranitifolia*	4.6	35	146	0.5	1.0	0.6	29.1	11.0	0.23
Sapung	Salapa	*Borassus flabellifer*	4.0	39	163	0.3	0.5	0.5	21.0	4.4	0.35
Landa	Ragi	*Eleusine-Coracana*	3.2	35	146	0.7	39.8	5.5	16.3	11.2	0.1
Ju	Yam	*Colocasia spp.*	6.5	54	223	0.3	8.0	0.5	2.0	—	0.3
Pendam	Rice	*Oryza Sativa*	6.1	41	173	0.4	0.3	1.2	13.7	7.7	0.23
Handi	Rice	*Oryza Sativa*	2.6	27	113	0.8	2.4	1.5	21.3	7.5	0.3
Handi	Rice	*Oryza Sativa*	3.5	29	121	0.3	2.9	1.3	3.1	2.4	0.2
Handi	Rice	*Oryza Sativa*	4.1	32	134	0.5	1.9	1.0	6.9	30.0	0.3
Handi	Rice	*Oryza Sativa*	7.5	67	280	1.4	4.0	1.0	36.4	—	0.4
Handi	Rice	*Oryza Sativa*	5.0	57	238	1.3	6.5	1.2	—	1.5	—
Harta	Rice	*Oryza Sativa*	3.5	36	151	0.5	3.4	0.8	0.02	18.1	0.4
Paura (distilled)	Mohua	*Bassia Longifolia*	22.8	132	552	—	—	—	—	—	—
Handi (distilled)	Rice	*Oryza Sativa*	29.0	169	707	—	—	—	—	—	—
Ripi-Ralu (distilled)	Mohua	*Bassia Longifolia*	32.8	192	803	—	—	—	—	—	—

Table 11. Nutritional Data on Some Indian Noncultivated Wild Leguminous Seeds (Pant et al., 1974a)

TABLE I

Protein efficiency ratio and net protein ratio of some uncultivated leguminous seed protein isolates

Protein source	Weight change rat in 4 weeks (g)	PER	NPR	B.V.	D.C.
Nitrogen free (12)	−13·5	...	...	...	...
Casein (10)	39·8 ± 1·7	2·55	3·27	92·0	96·0
Acacia arabica (12)	−3·8	...	...	...	...
•*Acacia arabica* (9)	25·5 ± 4·7	1·72	2·47	52·0	83·0
Acacia catechu (10)	−6·1	...	...	...	...
•*Acacia catechu* (11)	17·6 ± 1·7	1·47	2·42	46·0	84·0
Albizzia moluccana (12)	−7·9	...	...	...	...
•*Albizzia moluccana* (12)	20·2 ± 3·5	1·45	2·25	43·0	83·0
Albizzia richardiana (10)	21·2 ± 2·5	1·52	2·30	61·6	75·6
Bauhinia macrostachya (3)	−9·5	...	...	...	...
•*Bauhinia macrostachya* (3)	14·2 ± 1·6	1·05	2·05	63·0	82·0
Bauhinia malabarica (13)	−5·3	...	...	...	...
•*Bauhinia malabarica* (12)	12·6 ± 2·7	1·38	2·85	55·7	75·3
Bauhinia variegata (11)	−8·1	...	...	...	...
•*Bauhinia variegata* (9)	16·1 ± 1·8	1·05	1·93	56·6	72·2
Cassia acutus (4)	−4·9	...	...	...	...
•*Cassia acutus* (9)	13·5 ± 2·6	1·03	2·00	47·9	75·8
Leucena glauca (10)	13·3 ± 3·8	1·16	2·10	37·0	78·0
Pithecellobium dulce (11)	−9·1	...	...	...	...
•*Pithecellobium dulce* (12)	24·8 ± 2·0	1·54	2·37	62·6	77·5

Figures in brackets denote the number of animals.

• Supplemented with L-Methionine (0·15%) and L-Tryptophan (0·20%). Dietary protein was at 10% level and the rats employed initially weighed between 40—5 g.

Table 12. Amino Acid Composition of Some Wild Legumes of India (Pant et al., 1974b)

Proximate chemical composition of some nonedible leguminous seeds
(Results expressed as percentage on dry weight basis)

SEED	Crude Protein	Ether Extractives	Nitrogen free Extract	Crude fibre	Total ash	Calcium mg/100 g	Phosphorus mg/100 g	Iron mg/100 g	Niacin mg/100 g	Ascorbic acid mg/100 g
Acacia arabica	26·4	3·3	62·9	2·7	4·7	673	420	4·95	3·17	4·51
Acacia catechu	44·2	6·6	41·6	3·5	4·1	578	445	5·15	1·63	6·11
Acacia mellanoxylon	29·7	5·5	47·0	2·[illegible]	4·9	707	412	7·19	2·93	6·95
Acacia senegal	31·9	5·5	54·0	3·7	4·9	718	396	7·10	2·45	6·93
Albizzia lebbek	39·5	6·8	45·3	4·2	4·2	172	620	11·50	5·21	1·75
Albizzia mollucana	33·5	5·6	52·5	3·8	4·6	[illegible]	365	4·90	1·46	6·58
Albizzia odoratissima	38·6	6·7	47·2	2·9	4·6	682	338	3·81	1·06	2·83
Albizzia richardiana	40·0	7·4	44·3	3·5	2·8	159	570	12·84	4·62	2·65
Bauhinia alba	30·7	15·4	46·6	3·2	4·1	273	192	3·91	2·54	1·62
Bauhinia acuminata	31·8	18·2	43·7	2·9	3·4	255	165	3·20	4·13	1·68
Bauhinia macrostachya	22·8	20·7	50·9	2·1	3·5	105	257	8·10	12·82	4·26
Bauhinia malabarica	27·0	17·8	45·6	3·2	3·4	142	293	13·30	9·20	6·84
Bauhinia racemosa	31·0	22·7	39·5	3·7	3·1	121	201	14·40	15·81	4·25
Bauhinia variegata	34·1	16·5	43·1	3·2	3·1	312	120	4·29	3·91	1·60
Cassia alata	36·8	6·8	49·4	2·6	4·4	135	650	22·40	3·21	2·56
Cassia grandis	12·8	5·0	75·6	3·7	2·9	124	203	3·10	6·59	2·68
Cassia marginata	16·5	6·8	68·4	4·6	3·7	149	191	11·36	9·15	6·28
Cassia obtusifolia	23·9	5·2	60·9	4·[illegible]	5·2	153	215	10·57	8·25	3·56
Cassia occidentalis	35·2	5·0	51·3	3·8	4·7	160	226	10·95	7·54	4·29
Cassia reticulata	12·9	3·5	75·8	4·5	3·3	133	178	12·67	9·03	5·42
Cassia tomentosa	21·8	6·9	62·6	5·3	3·4	155	430	8·20	3·82	3·10
Crotalaria juncea	32·4	2·8	53·6	2·1	3·1	291	326	7·91	2·95	1·39
Crotalaria medicaginea	47·5	3·4	43·2	2·6	3·[illegible]	167	352	8·57	3·12	2·05
Dolichos lablab (Edible)	21·3	2·3	69·6	2·9	3·9	269	361	9·20	2·07	0·65
Erythrina indica	23·1	13·7	53·1	3·5	4·6	214	201	12·27	1·28	1·97
Glycine hispida (Edible)	46·8	21·1	23·6	3·2	5·3	317	272	10·79	3·14	1·17
Mucuna pruriens	29·3	9·0	53·7	4·1	3·9	238	159	13·52	3·64	4·78
Pithecellobium dulce	24·4	11·7	57·2	3·7	3·0	254	370	3·55	4·87	1·62

Table 13. Nutritional Analyses of Some Edible Wild Green Leaves from Southern India (Theophilus and Arulavantham, 1948)

Analyses of green leafy vegetables used by the common people in Madras city.

(Value per 100 g.)

Tamil name.	Botanical name.	Moisture, g.	Protein, g.	*Ether extractives, g.	Total ash, g.	Calcium, g.	Phosphorus, g.	Iron, mg.	Calories.	Vitamin C, mg.
Paruppu keerai ...	*Portulaca oleracea* ...	94·11	1·67	...	[illegible]	[illegible]	[illegible]	23·69	35	28·03
Radish tops ...	*Raphanus sativus* ...	90·37	2·43	...	[illegible]	[illegible]	[illegible]	17·53	46	119·5
Kuppameni ...	*Acalypha indica* ...	80·54	6·74	1·41	3·14	[illegible]	0·99	17·31	64	147·9
Mudakattan ...	*Barbaea repens* ...	84·53	6·09	0·90	4·31	[illegible]	[illegible]	18·39	63	† 27·23
Pacharisi keerai ...	*Euphorbia hirta* ...	75·11	4·65	1·71	3·15	[illegible]	[illegible]	21·24	120	44·32
Veila keerai ...	*Cleome viscosa* ...	80·41	5·64	1·55	3·73	[illegible]	0·073	24·43	93	†203·6
Neruncy ...	*Tribulus terrestris* ...	79·09	7·22	0·541	4·63	1·55	[illegible]	9·22	93	41·53
Sarvallai keerai ...	*Trianthema monogyna*	91·33	2·01	[illegible]	2·62	0·036	0·03	35·34	36	†69·60
Punnakku keerai ...	*Corchorus acutangulus*	80·60	6·12	0·67	2·31	0·23	0·035	33·65	45	†145·9
Koppa keerai ...	*Amaranthus viridis* ...	81·73	3·17	0·33	2·44	0·33	0·032	18·74	34	†175·0

* Ether extractive includes chlorophyll. † Vitamin C estimation done on different sample.

Plate II.

Green leafy vegetables used by people in Madras city

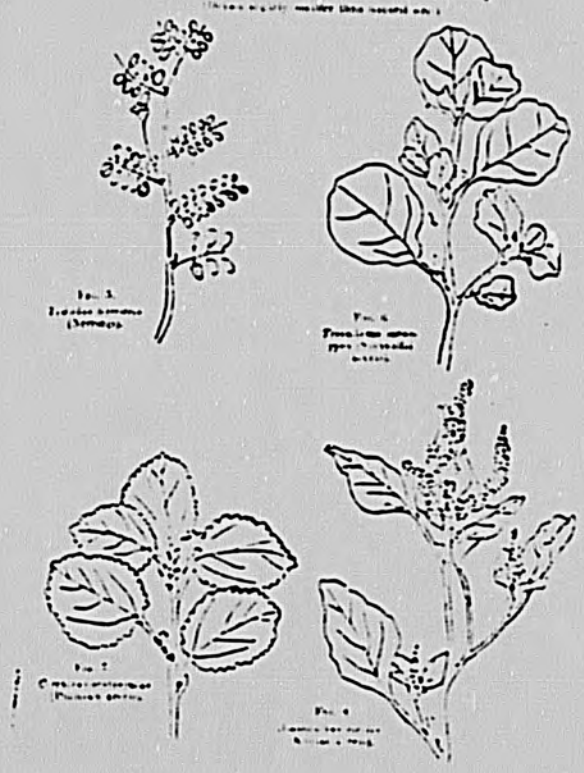


Table 14. Composition of Indian Food-Stuffs (Ghosh and Guha, 1933)

Bengali names of food-stuffs.	Botanical names.		Vitamin B (international units per 100 g. fresh food).	Vitamin B_2 (units* per 100 g. fresh food).	Percentage in the edible portion of the fresh tissue.			
					Fe.	Ca.	P_2O_5.	Protein.
[illegible] ..	*Brassica oleracea.*	*Cruciferæ.*	25	9	[illegible]	0·179	[illegible]	[illegible]
[illegible] ..	*Hibiscus esculentus.*	*Malvaceæ.*	20	2	[illegible]	0·12	0·112	1·6
[illegible] ..	*Kaphora esculenta*	*Cucurbitaceæ.*	25	0	[illegible]	0·16	0·0792	2·1
[illegible] ..	A variety of *Musa paradisiaca.*	*Musaceæ.*	4	8	[illegible]	..	[illegible]	[illegible]
[illegible] ..	*Ipomœa reptans.*	*Convolvulaceæ.*	20	2	[illegible]	[illegible]	0·147	1·7
[illegible] ..	*Amaranthus spp.*	*Amaranthaceæ.*	0	10	[illegible]	0·163	[illegible]	1·6
[illegible] ..	*Colocasia indica.*	*Aroideæ.*	20	20	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] ..	*Spinacia oleracea.*	*Chenopodiaceæ.*	20	20	[illegible]	[illegible]	0·016	[illegible]
[illegible] ..	*Trichosanthes dioica.*	*Cucurbitaceæ.*	10	20	[illegible]	[illegible]	[illegible]	1·93
[illegible] ..	*Beta vulgaris.*	*Chenopodiaceæ.*	40	10	[illegible]	0·134	0·131	1·2

* Units as defined by Guha and Chakravarty (1933).

Table 15. Nutritive Value of Selected Indian Food-Stuffs (Ghosh and Guha, 1934)

TABLE.

Serial No.	Foodstuffs. Bengali names.	Foodstuffs. Botanical names.	Units of vitamin "A" (in lacs).	Units of vitamin "B₁" (in lacs).	Units of vitamin "B₂" (in lacs).
	VEGETABLES.				
1	Alu (Kumuri) ..	*Solanum tuberosum* (*Leguminosae*).	..	40	25
2	Am (Mango) (Bombay)	*Mangifera indica* (*Anacardiaceae*).	20	11	23
3	" (Langra) ..		20	16	15
4	" (Fazli) ..		30	23	20
5	Ash-fruit ..	*Sapindus laurus*	..	0	0
6	Begun (Egg fruit) ..	*Solanum melongena* (*Solanaceae*)	..	20	100
7	Chal-Kumrah ..	*Benincasa cerifera* (*Cucurbitaceae*).	..	0	0
8	Hinche	*Enhydra fluctuans* (*Compositae*)	..	25	10
9	Jamrool	*Eugenia malaccensis*	..	2	2
10	Kala-Jam ..	*Eugenia jambolana* (*Myrtaceae*)	..	0	0
11	Kanthal (Jack-fruit)	*Artocarpus integrifolia* (*Artocarpaceae*).	..	20	16
12	Karela	*Momordica charantia* (*Cucurbitaceae*).	..	20	20
13	Khorma (Dates) ..	*Cucumis sativus* (*Cucurbitaceae*)	..	6	10
14	Kumrah	*Cucurbita maxima* (*Cucurbitaceae*)	..	10	2
15	Kumrah-sak ..	Leaves of *Cucurbita maxima* (*Cucurbitaceae*).	..	8	20
16	Lachin (Indian Lychee)	*Nephelium litchi* (*Sapindaceae*)	..	14	0
17	Mosri	Spathe of *Musa paradisiaca* (*Musaceae*).	..	2	0
18	Pamphal ..	*Trapa bispinosa* (*Lythraceae*)	..	18	0
19	Pelta	Leaves of *Trichosanthes dioica* (*Cucurbitaceae*).	..	12	25
20	Rangaala ..	*Ipomoea batatas* (*Convolvulaceae*)	..	12	10
21	Shim-sim ..	*Dolichos lablab* (*Leguminosae*).	..	25	100
22	Uchinge	*Momordica charantia* (*Cucurbitaceae*).	..	4	10
	CONCETTA, PULSES, ETC.				
23	Chickpea ..	*Cicer arietinum* (*Leguminosae*)	60	15	60
24	Kalai-mung (green)	*Phaseolus mungo* (*Leguminosae*)	20	10	16
25	" (mature)		100	100	20
26	Masuri Dal ..	*Lens esculenta* (*Leguminosae*)	45	40	25
27	Matar (Pattani) ..	*Pisum sativum* (*Leguminosae*)	45	40	80
28	Sonamung ..	*Phaseolus radiatus* (*Leguminosae*)	15	15	0
	FISH, ETC.				
29	Bhetki-fish ..	*Lates calcarifer*	23	16	1
30	Hilsa-fish ..	*Clupea ilisha*	1	10	4
31	Katla-fish ..	*Catla catla*	20	0	27
32	Khalsa-fish ..	*Trichogaster fasciatus*	33	33	25
33	Koi-fish	*Anabas scandens*	20	10	2
34	Magur-fish ..	*Clarias batrachus*	10	8	37
35	Mrigal-fish ..	*Cirrhina mrigala*	21	10	0
36	Parshe-fish ..	*Mugil parsia*	[illegible]	10	16
37	Rohu-fish ..	*Labeo rohita*	53	15	50
38	Shingi-fish ..	*Saccobranchus fossilis*	25	0	20
39	Shol-fish ..	*Ophiocephalus striatus*	20	0	2
40	Tengra-fish ..	*Bagrus bagarius*	27	0	2

Table 16. Nutritional Composition of Indian Food-Stuffs (Ranganathan et al., 1937)

Vegetables: leafy.

Name	Botanical name	Source	Moisture per cent	Protein per cent	Other extractives per cent	Mineral matter per cent	Fibre per cent	Carbohydrate per cent	Calcium (Ca) per cent	Phosphorus (P) per cent	Iron (Fe) per cent	Vit. Thiamine per lb.
1	2	3	4	5	6	7	8	9	10	11	12	13
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Coimbatore	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Coimbatore	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Coimbatore	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Coimbatore	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Coimbatore	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Local	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Madurai	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cambodia/Vietnam

Matras and Martin (1972) provide extensive details on the ethnobotany of Cambodia with specific attention to numerous edible wild plants (Table 17). Vy (1971) provides basic information on the nutritional value and composition of foodstuffs consumed by Vietnamese rural adults, noting use of wild resources as still important in urban diet.

Malaysia

If the work of Vidal is key to understanding the wild edible foods of Laos, the monograph by Burkill (1935) is the most important for Malaysia. One is immediately struck by the quality and composition of Burkill's work (Appendix 8) in which thousands of plants are treated, examined for geographical-spatial distribution, economic uses, and cultural traditions. Of parallel importance is the monograph by Ochse and van den Brink (1925) on vegetables of the Dutch East Indias, with special reference to edible tubers, bulbs, rhizomes, and spices (Appendix 9). Similar importance may be attached to the ethnobotanical monographs by Chai (1975; 1978) on Malaysian plants, although most treated are medicinal.

While Malaysia is a progressive state, experiencing the problems of urban growth, there remain several hunter-gatherer societies. Robson et al. (1973) studied the nutritional status of the Orang Asli hunters, especially the children, and noted that their nutritional status is better than either urban or rural Malay — due to dietary diversification. Burkill (1953) identified more than 110 plants consumed with rice in Malay tradition, 16% being wild. The more important wild species he identified included Collybia albuminosa, Dendrocalamus asper, Diplazium esculentum, Hydrocotyle asiatica, Ipomoea reptans, Sauropus androgynus, Solanum torvum, and Stenochlaena palustre. Christine Wilson, one of the leaders of cultural nutrition, conducted field work in rural Malaysia and has produced several important works outlining nutritional status and dietary use of edible

wild plants (1967; 1975), noting extensive use of edible wild greens such as Parkia speciosa, Sandoricum koetjape, and widespread use of wild Metroxylon spp.

Other writers who have examined single edible species in Malaysia have included Keng (1972) on Cycad seed, noting Cycas rumphii and Cycas siamensis as the principle species used and commenting on the cultural-technological methods used to reduce pakoein (cycasin) concentration in the seeds before human consumption (pakoein is a toxic glycoside). Lim (1972) identified several common fungi used as dietary staples in Malaysia and Singapore, especially Agaricus bisporus, Lentinus edodes, and Volvariella volvacea. Peregrine (1973) also worked on edible mushroom species, especially Agaricus) in Brunei on the island of Borneo, and also provided data on Auricularia delicata, Lentinus sajor-cajo, Schizophyllum commune, and Termitomyces clypeatus. Bende and Ismail (1975) reported data on Malay use of Sauropus albicans, a small shrub found growing wild in Malaysia and throughout much of southeast Asia. They note that the leaves contain 70 grams protein per kg, and are widely consumed on an average of once per week up to 200 grams.

General nutritional surveys conducted in Malaysia have included those by Burgess et al. (1950) and detailed investigations by Ellis (1975) and Oldrey (1975) on the nutritional status of Punan Busang, noting widespread consumption of wild sago and extensive use of wild ferns.

There have also been several important studies of the energy and nutrient values of Malay foods. Rosedale and Milsum (1940) report data on 62 species of edible wild greens (Table 18) while general food composition tables for Malay patterns were prepared by Willimott (1949). More recently, Caldwell and Enoch (1972) examined the riboflavin content of Malaysian leaf vegetables, noting that numerous wild species had elevated values and that greater use of such wild products should greatly be encouraged.

Burma

Aung-Than et al. (1976) briefly mention that wild water spinach (Ipomoea aquatica) is widely consumed throughout Berma.

Indonesia (Map 2)

Hudson (1972), writing on the Ma'anyan of Indonesian Borneo, reports a variety of wild edible products; from December through March, wild forest fruits ripen and include rambutan (Nephelium lappaceum), durian (Durio zibethinus), tjempedak (Artocarpus champeden), nangka (Artocarpus intergrifolia), langsat (Lansium domesticum), and mangosteen (Garcinia mangostana). Dransfield (1976) identified the edible palms used throughout western Indonesia, among the more important being: Corypha elata, Metroxylon sagu, Caryota mitis, Arenga pinnata, Eugeissona utilis, Oncosperma horridum, Borassodendron spp., Liculala spp., Daemonorops melanochaetes, Daemonorops hallierana, Daemonorops fissa, Cocos spp., Borassus spp., Nypa spp., Salacca edulis, Pinanga spp., and Areca catechu.

Philippines (Map 3)

Of all the countries of southeast Asia, the Philippines is among the best represented in studies on edible wild plants. Early monographs by Webster (1916) review both domesticated and wild species used throughout the islands (Appendix 10) while Brown (1920) documented extensive utilization of wild food resources, recording more than 900 vernacular names for species consumed (Appendix 11). More recently Quisumbing (1960) reviewed the state of ethnobotanical research in the Philippines and Jacalne (1960) identified the domesticated and wild edible fruit trees throughout the country. Quisumbing (1965) has investigated the historical-dietary impacts of plant introductions throughout the Philippines and Monsalud et al. (1966) wrote on edible wild species found in forest lands, identifying more than 360 edible species (Appendix 12). The danger of relying only on "published references" and not examining the published account in detail is seen by authors who cite Quisumbing (1932) -- when in fact the data were never

MAP 2 INDONESIA

After Leber (1977)

published (see below)!

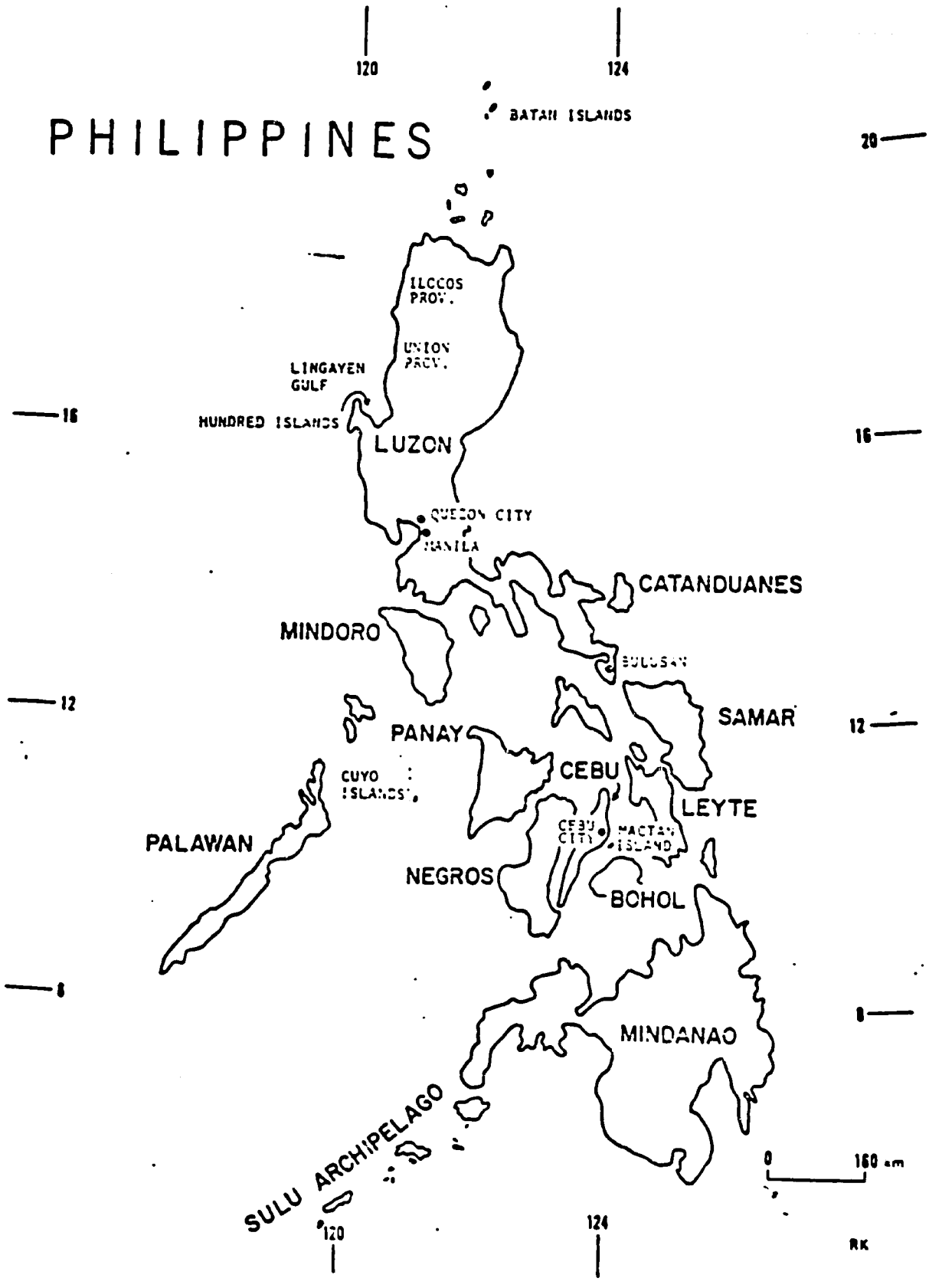
October, 1932 PHILIPPINE SCIENCE CONVENTION 211

8. THE UTILIZATION OF WILD PHILIPPINE PLANTS
Eduardo Quisumbing
(To be published later.)

Attention in recent years has been directed towards the diet and ecology of the Philippine Tasaday, a forest people recently "discovered" living as hunter-gatherers and utilizing stone technology (see Elizalde and Fox, 1971; Fernandez and Lynch, 1972; Yen and Gutierrez, 1975; and Yen, 1975). Work by Robson and Yen (1976) details the baseline data on diet and will permit suitable conclusions to be drawn regarding improvement/deterioration of diet with subsequent agricultural-technological development (Table 19).

Classic studies on ethnography that contain information on wild plant use by traditional Philippine societies include the work by Cole (1922) on the Tinguian of northwestern Luzon who noted 38 species regularly used — eighteen identified (Table 20). Hart (1954) studied Barrio Caticugan, a Visayan Filipino community and noted sustained maintenance of gathering as a reflection of poor food supply with concentration on Amorphophallus campanulatus, Dioscorea divaricata, Dioscorea hispida, Pithecolobium dulce, and Syzygium cumini. Hart (page 531) suggests that utilization of wild plants would stop if agricultural/economic development occurred. Cole (1956), writing on the Bukinon of Mindanao, focused

MAP 3 PHILIPPINES



After Leber (1977)

on domesticated food resources, then described ferns, bulbs, bamboo shoots, palm, mushrooms, and leaves and seed pods as major dietary elements (but offered no Latin determinations for the species). Conklin (1957) described Hanunoo agriculture and mentioned briefly extensive use of wild plants as food.

Abrams (1961), writing on the Mansaka of Magnaga, Pantukan, and Davao, identified 31 edible species (Table 21), while Warren (1964) described the Batak of Palawan, noting their use of edible roots, leaves, nuts, ferns, mushrooms, and other forest products. Hart (1965), describing the buri palm use among Bario Caticugan Negros, notes its extensive role in production of intoxicating beverages. Brugues (1968) worked in the Cagayan Valley of the northern Philippines and described numerous wild plants extensively used as food, among them Allaeanthus luzonicus, Antidesma bunius, Eugenia calubcob, Eugenia cumini, Eugenia javanica, Moringa oleifera, and Spondias purpurea. Schlegal and Guthrie (1973) described the diet and shift from swidden to plow farming among the Tiruray and noted that wild foods provide up to 7% of calories, 38% protein, 42% calcium, 13% iron, 23% vitamin A, 37% B-complex, and 5% vitamin C (see Table 22). Eder (1978) studied the energy expenditure for obtaining wild foods among the Batak in a region where wild fruits were not abundant. He noted, however, extensive use of Dioscorea hispida and Dioscorea luzonensis in Batak diet.

Other research in the Philippines has considered specific wild foods or wild food groups. General studies on vegetables and fruits include those by Agcaoili (1916) who identified six important items, Amaranthus colitis, Amaranthus oleraceus, Athyrium esculentum, Carica papaya, Ipomoea reptans, and Momordica charantia. Tadeo (1963) worked on edible fruits and recognized more than 1,000 plants with edible portions as present throughout the Philippines; he provides data on 103 species (Appendix 13) and concludes with the warning "be prepared",

a reference to the lessons learned from food shortages experienced in the Philippines during World War Two. Uichanco (1971) surveyed a number of markets and documented the presence and sale of many wild plants as dietary items, among them Bambusa spinosa, Phyllostachys edulis, Sinocalamus beccheyanus, Spondias purpurea, Monascus purpureus, Moringa oleifera, Basella alba, Basella rubra, Ipomoea aquatica, Allaenthus luzonicus, Artocarpus camansi, Artocarpus heterophylla, Gnetum gnemon, Helminthostachys zeylamica, Athyrium esculentum, Ceratopteris thalictroides, Nymphaea spp., Vallisneria gigantea, Volvariella volvacea, Termitomyces albuminosa, Gracilaria conferuoides, Porphyra spp., Gelidum spp., Halymenia spp., Eucheuma spp., and Hypnea spp.

Dietary use of seaweed is common throughout the Philippines. Bersamin et al. (1961) provides data on 12 widely used types (Table 23), while Domantay (1961) has provided a detailed account of the ecological conditions for seaweed growth and development from the Hundred Islands vicinity, with brief notes on their dietary use. Antonio (1962) reports seaweed use, expecially from species of Caulerpa, Gracilaria, and Rhodymenia.

Turning to individual reports on specific wild foods, Wester (1920) described adlay, Coix lacry majobi var. mayuen, and its dietary use, while Reinking (1921) and Mendoza (1938) describe the principal types of edible mushrooms (Appendix 14). The nutritive value of Cytosperma merkussi was considered by Gesmundo (1932) while Mendoza (1934) studied Lepiota americana, a recently introduced edible mushroom. Garcia (1940) completed a comparative study of pili, Canarium ovatum, while Baranov (1960) reported on the Manchurian dwarf cherry and its wild form Cerasus japonica. Manalae and Collantes (1964) performed laboratory studies on Nephelium mutabile, or wild bulala, noting that the seeds were high in protein (12.6%).

Nutritional surveys conducted within the Philippines have been numerous. A number of these provide some data on the utilization of edible wild plants. Merrill (1909) conducted a medical survey of the town of Taytay and focused on the principal foods utilized by the inhabitants, noting widespread use of bamboo shoots in local diet. Other studies have been completed by Quiogue et al. (1963a) on Ilocos, Mt. Province region; Quiogue et al. (1963b) on the Cagayan Valley of Batanes region; and Quiogue et al. (1965) on the southern Tagalog region.

The bulk of the nutritional studies, however, have focused on the nutrient composition of wild and domesticated foods found throughout the Philippines. Early accounts include those by Santos and Santos (1926) on the vitamin B content of wild fruits and vegetables, especially Amaranthus viridis, Celosia argentea, and Diplazium esculentum (protein values ranging from 3.3 - 6.2%). Francisco and Wester (1930) provided nutritional data on 13 wild species, several very high in protein (Table 24), while Valenzuela and Wester (1930) reviewed 36 wild and domesticated species for basic protein-carbohydrate values. Adriano (1933) reported the chemical composition of Philippine mushrooms, while Hermano and Aguila (1935) presented data on the vitamin A and B-complex values of various fruits and vegetables (wild), among them Achras zapota, Anona muricata, Artocarpus champeden, Ceratopteris thallictroides, Ipomoea reptans, Psophocarpus tetragonolobus, and Sandoricum koetjape.

Maranon (1935) completed a major work on mineral composition of Philippine foods, reporting more than 800 samples, and on 14 very exciting wild leafy plants (Table 25). Alejo et al. (1953) found 16 nutritionally important wild foods among 800 sampled (Table 26). Availability of calcium in wild plants has been a research focus of several scientists, among them Bendana-Brown and Lim (1958) and Bendana-Brown and Benzon (1960). Their studies on edible wild greens document that oxalates bind calcium, making it unavailable to humans who consume such foods,

but that a number of plants, especially Alloenthusluzonicus blanco and Brassica integrifolia are excellent sources of dietary calcium.

Basic food composition tables for use in the Philippines provide abundant data on both wild and domesticated food resources. Among the more important such works are those by Bocobo et al. (1951), Intengan et al.(1953), Intengan et al. (1954), Intengan et al. (1955a), Intengan et al. (1955b), and Onate et al. (1964). Examples from these works with specific application to the nutritwonal values of edible wild plants are presented in Appendix 15.

China-Japan-Korea

Between the years 1958-1962 a number of tantalizing titles appeared in the West regarding widespread utilization of edible wild plants. We were unable to secure copies of these reports during the limited research time we had for this project. Nevertheless, their full citations are included in our list of references (see Sung Ching-Lung, 1958; Chiao Tseng-Chien and Yin Tsu-T'ang, 1959; Ts'ai Hsi-T'ao and Pei Sheng-Chi, 1959; Chien Shih-Hsin, 1959; Ching Jen-Cheng, 1960, and Baranov, 1962). An overview of the utilization of wild plants in China by Cheng (1965) notes that there are between 2-3 thousand edible wild species commonly collected. He provides basic figures on wild species utilized as starchy fruits (900), for their oil value (400) -- of which 35 are commonly consumed, including Hodgsonia macrocarpa and Litsea citrata.

The theme of famine foods, so commonly seen in portions of Africa, has also been important in the Chinese literature. Read (1946) translated the work of Chu Huang Pen Ts'ao, who wrote in the 15th century a text entitled Chiu-Huang Pen-Ts'ao. This text identifies 415 plants used during famine and provides the name, description, and use of each. All plants are classified as herbs, trees, cereals,

Appendix 16

fruits, or vegetables and by the respective portion utilized. More recently, Baranov (1967) has provided data on wild plants used by Chinese in Manchuria, noting 56 famine foods, and 85 species regularly consumed (Table 27).

General studies on the nutritional composition of Chinese foods include those by Embrey and Wang (1921), Abe (1927), and Hou (1935). The work by Adolph (1926) looked specifically on edible wild plants and he published data on the nutrient composition of Acorus calamus, Nelumbium speciosum, and three species with high protein or caloric values (Hemerocallis aurantiaca, Peziza auricula, and Zizyphus jujuba). Sherman and Tsan Ching-Wang (1929) studied 37 foods for protein values and 9 of these were wild species: Hydropyrum latifolium (13.3% protein), Chrysanthemum coronarium (25.8% protein), Arctium lappa (10.5%), Cedrela sinensis (37.7%), Hemerocallis fulva (11.4%), Zizyphus vulgaris (2.9%), Eleocharis tuberosa (5.7%), Benincasa hispida (11.3%), and Sagittaria sagittifolia (20.3% protein). Harris et al. (1949), writing on the composition of Chinese foods, provides data on numerous foods and 9 wild species with economic-dietary importance (Table 28).

The most current nutritional evaluation of China is found in the publication by Whyte (1972) although there is no mention there of dietary utilization of edible wild plants. A recent account by Hammerschindt (1980) on a species of wild, edible mushroom from Szechwan reveals the interesting relationships between diet and medicine, whereby individuals utilizing such mushrooms may reduce their blood pressure, essentially "thin" the blood, and at the same time complete their meal composed of especially tasty food components.

We obtained only fragmentary information on the dietary utilization of wild plants for both Japan and Korea. Oiso (1976) has outlined the history of food and dietary patterns in Japan, but provides little insight on the roles

TABLES 17 - 28 FOLLOW

TEXT RESUMES ON PAGE 63

Table 17. Selected Edible Wild Plants of Cambodia (Matras and Martin, 1972)

B. Classement d'après la catégorie alimentaire

a) Plantes faisant l'objet d'une préparation culinaire (cuisson)

Amaranthus spinosus
Amorphophallus sp.
Aroideae
Artocarpus integra
Acacia cavata
Mitrozia Lebbeck
Bambusa spp.
Berrimatonia acutangula
Benincasa hispida
Cassia occidentalis
Carica sp.
Cajanus Cajan
Canavalia ensiformis
Canavalia sp.
Coccinia indica
Coix lacryma-Jobi
Cucumis sativus
Cucurbita maxima
Cyclosorus sp.
Dioscorea alata
Dioscorea brevipetiolata
Dioscorea bulbifera
Dioscorea hispida
Dioscorea pentaphylla
Dioscorea aff. persimilis
Dioscorea sp.
Dolichos Lablab
Garcinia sp.
Gnetum sp.
Hibiscus cannabinus
Hippocratea indica
Ipomoea batatas
Ipomoea sp.
? *Labiatae*
Lagenaria siceraria
Lasia spinosa
Luffa cylindrica
Manihot spp.
Markhamia Pierrei
Merremia umbellata
Momordica charantia
Morinda citrifolia
Musa spp.
Nephrolepis sp.
Oryza sativa
Psophocarpus tetragonolobus
Sesbania grandiflora
Smilax sp.
Solanum melongena
Solanum saccharatum
Stachyocnem pedicellis
Stephania hermandifolia
Sterculia spp.
Tacca aff. racemosa
Zea Mays

b) Condiments

Alium sativum
Amaranthus sp.
Antidesma Ghaesembilla
Capsicum frutescens
? *Cedrus cambodicus*
Curcuma longa
Cymbopogon Nardus
? *Labiatae*
Limnophila conferta
? *Mentha sp.*
Ocimum basilicum
Polygonum malaiaricum
Polypnonum odoratum
Spondias pinnata
Zingiber officinale

c) Fruits consommés crus

Annona cornosa
Antidesma diandrum
Antidesma Ghaesembilla
Artocarpus integra
Bacaurea sapida
Carica Papaya
Citrus pentandra
Citrus aurantifolia
Citrus grandis
Citrus reticulata
Cucuphis Leonulci
Dillenia ovata
Elaeocarpus rubiginosum
Ficus sp.
Glycosmis pentaphylla
Mangifera indica
Mangifera sp.
Musa spp.
Nephelium Lappaceum
Phyllanthus Emblica
Psidium Guajava
? *Sapindaceae*
Schleichera oleosa
Spondias pinnata
Tamarindus indica
? *Vernonia cinerea*
Willughbeia cochinchinensis

d) Thés consommés crus

Saccharum officinarum

e) Plantes utilisées pour la fabrication de la bière de riz

Mitrozia malaccensis
Hydnocarpus pierrei
Garcinia aff. gracilis
Oryza sativa
Saccharum officinarum
? *Zingiberaceae*

Table 18. Malay Leaf and Other Vegetables and Their Analyses (Rosendale and Milcum, 1940)

ANALYSES OF VEGETABLES.

Index No.	Scientific Name.	Malay Name.	Moisture.	Ash.	Protein.	Fat.	Fibre.	Carbohydrate.	Calories.	CaO.	Mg.	P_2O_5.	Fe.	Vitamin C. mg/100g.	Carotene (expressed as Vitamin A) I.U./100g.	Index No.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.			
1	*Gynandropsis gynandra*	Maman	88.3	2.1	4.1	0.5	1.8	7.2	35	0.360	0.016	0.129	0.0081	72.0	6,600	1
2	*Portulaca oleracea*	Gelang pasir ...	84.6	2.7	2.5	0.2	2.0	8.0	45	0.229	0.037	0.058	0.00279	11.0	4,900	2
3	*Garcinia atroviridis*	Pucuk asam gelugor	79.1	0.8	1.8	0.4	2.6	15.3	71	0.121	0.018	0.051	0.00209	37.2	1,100	3
4	*Chonopeneon Griffithii*	Chempedak	72.0	4.3	7.0	0.4	4.7	11.6	80	0.838	0.065	0.210	0.00301	42.5	4,200	4
5	*Melia excelsa*	Setang	77.1	1.3	6.2	0.6	2.7	11.8	78	0.171	0.014	0.136	0.00161	36.0	7,900	5
6	*Vitis repens*	Rtang-tang	89.6	0.9	1.8	0.3	1.5	6.2	32	0.127	0.024	0.057	0.00189	21.0	2,900	6
7	*Inocarpus edulis*	Pucuk jangus	89.1	0.9	3.3	0.2	1.5	4.5	36	0.074	0.012	0.133	0.00117	9.3	3,780	7
8	*Moringa oleifera*	Kemungal	76.0	2.1	9.1	2.0	1.2	9.6	95	0.161	0.033	0.159	0.000899	9.8	7,900	8
9	*Sesbania grandiflora*	Gati	77.2	1.5	8.1	1.1	2.4	9.4	81	0.218	0.029	0.135	0.000315	49.6	22,000	9
10	*Neptunia prostrata*	Keman	91.9	1.3	3.5	0.3	1.5	1.5	23	0.210	0.016	0.096	0.0146	46.1	12,310	10
11	*Eugenia Buthieana*	Samak nasi	75.2	1.0	1.9	1.0	2.8	18.1	91	0.338	0.015	0.068	0.00291	24.2	9,200	11
12	*Carica papaya*	Betek	83.3	1.4	5.6	0.4	1.0	8.3	61	0.406	0.035	0.115	0.00636	34.6	23,900	12
13	*Hydrocotyle javanica*	Pegaga gajah	89.9	1.9	1.2	0.4	1.3	5.3	30	0.241	0.052	0.166	0.0098	70.2	5,760	13
14	*Hydrocotyle asiatica*	Pegaga	89.2	1.3	2.0	0.1	1.6	5.8	33	0.215	0.020	0.148	0.0056	57.0	7,500	14
15	*Hydrocotyle asiatica* var. ...	Pegaga kukur	91.4	1.9	2.3	0.3	1.3	2.8	24	0.282	0.029	0.108	0.0107	78.0	6,700	15
16	*Oenanthe javanica*	Seloin	91.6	1.7	1.1	0.4	1.0	4.2	25	0.193	0.021	0.198	0.00225	67.0	5,130	16
17	*Carum involucratum*	Sawi	85.2	1.6	2.9	0.3	2.4	7.6	46	0.120	0.015	0.071	0.0078	49.4	15,600	17
18	*Nothopanax scutellarium* ...	Semengkok	65.3	2.0	3.3	0.4	1.8	27.2	129	0.224	0.017	0.079	0.00112	23.4	20,000	18
19a	*Nothopanax fruticosum*	Daun teh china (young leaf)	83.4	1.6	2.8	0.2	2.5	9.5	52	0.275	0.015	0.077	0.0033	49.2	15,000	19
20	*Nothopanax fruticosum*	Daun teh china (old leaf)	82.5	1.8	2.6	0.4	2.3	10.4	57	0.271	0.018	0.071	0.00319	56.8	17,000	19a
21	*Murinda citrifolia*	Mengkudu	89.1	1.2	3.9	0.6	3.0	2.2	31	0.160	0.035	0.061	0.00279	112.4	16,000	20
22	*Cosmos caudatus*	Ulam raja	91.1	1.6	2.9	0.3	1.6	0.4	17	0.380	0.031	0.171	0.00148	67.8	9,500	21
23	*Felipia alba*	Aring-aring	88.0	2.2	2.3	0.9	1.1	5.5	40	0.273	0.066	0.015	0.00128	35.0	14,500	22
24	*Urenia cinerea*	Tambak bukit	80.5	3.2	2.7	0.0	3.8	8.8	56	0.158	0.066	0.054	0.00368	65.0	11,[illegible]	23
25	*Hedera indica*	Belantas	81.8	2.1	2.9	0.2	1.0	11.7	62	0.312	0.024	0.100	0.00291	82.0	5,600	24
26	*Pentaphragma begoniaefolium* ...	Salang suang	86.6	0.6	1.9	1.2	1.8	7.9	51	0.192	0.011	0.031	0.000112	71.8	8,600	25
27	*Gymnema syringefolium*	Pucuk peper	80.1	1.6	3.6	0.8	3.2	11.7	70	0.174	0.018	0.035	0.00569	135.0	19,[illegible]	26
28	*Ipomoea batatas*	Ubi kelebek	91.8	1.1	2.5	0.2	1.1	1.3	17	0.180	0.015	0.068	0.0052	73.8	7,700	27
29	*Ipomoea repiana*	Kangkong	90.4	1.9	3.2	0.2	0.5	1.8	35	0.306	0.058	0.018	0.0702	51.7	14,000	28
30	*Solanum torvum*	Terong pipit (fruit) ...	71.6	1.7	2.1	1.1	12.6	10.0	61	0.451	0.011	0.215	0.00182	21.8	1,400	29
31	*Ocimum basilicum*	Kemangi	87.5	1.6	3.4	0.4	1.8	5.4	39	0.164	0.011	0.084	0.00175	46.2	2,400	30
	Coleus tuberosus	Ubi kembili (root) ...	71.7	0.8	1.9	0.1	0.9	24.6	110	0.096	0.028	0.077	0.00161	15.0	90	31

ANALYSES OF VEGETABLES—(*cont.*)

Index No.	Scientific Name.	Malay Name.	Moisture.	Ash.	Protein.	Fat.	Fibre.	Carbo-hydrate.	Calories.	CaO.	Mg.	P_2O_5.	Fe.	Vitamin C. mg/100g.	Carotene (expressed as Vitamin A.) I.U./100g.	Index No.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.			
32	*Basella rubra*	Rémayong	93.7	1.4	1.6	0.1	0.3	2.9	19	0.201	0.037	0.050	0.00128	28.9	3,100	32
33	*Amaranthus spinosus*	Bayam duri	83.0	4.1	5.2	0.3	1.6	5.8	48	1.771	0.161	0.201	0.0175	51.0	9,200	33
34	*Amaranthus caudatus*	Bayam selasih	70.1	2.0	3.9	0.2	1.9	21.5	106	0.353	0.016	0.077	0.00016	62.9	7,600	34
35	*Amaranthus gangeticus*	Bayam merah	90.5	2.6	2.4	0.2	1.4	2.7	24	0.215	0.058	0.110	0.0069	42.0	10,000	35
36	*Amaranthus viridis*	Bayam putih	91.0	1.5	2.3	0.1	0.8	1.3	16	0.135	0.052	0.138	0.00156	88.5	8,000	36
37	*Alternanthera tenuifolia*	Kéremak	89.3	2.1	2.9	1.3	1.8	2.6	35	0.302	0.017	0.168	0.00618	44.1	12,010	37
38	*Polygonum minus*	Késum	79.6	1.7	2.8	0.7	2.8	12.4	69	0.320	0.018	0.088	0.00315	170.0	52,000	38
39	*Polygonum hydropiper*	Cherohom	82.4	1.4	3.9	0.4	2.1	9.8	60	0.216	0.010	0.055	0.00119	118.0	15,000	39
40	*Piper sarmentosum*	Kadok	82.1	2.6	3.1	0.4	2.7	9.1	54	0.630	0.073	0.255	0.0131	61.8	19,000	40
41	*Embica officinalis*	Buah mélaka (fruit) ...	82.5	0.1	0.3	0.1	2.3	14.7	62	0.017	0.002	0.008	0.000301	162.0	440	41
42	*Sauropus androgynus*	Asin-asin	86.1	1.9	7.4	1.4	2.5	2.7	54	0.141	0.061	0.143	0.00376	110.0	47,520	42
43	*Glinsylon longifolium*	Salang	87.4	2.0	5.4	0.6	1.4	3.2	41	0.255	0.035	0.121	0.00179	344.0	23,220	43
44	*Pterococcus corniculatus* ...	Pina-pina	88.5	2.0	5.3	0.9	3.1	0.2	31	0.371	0.028	0.098	0.00035	227.0	6,800	44
45	*Manihot utilissima*	Ubi kayu	81.2	1.4	6.6	1.1	1.9	4.8	57	0.330	0.039	0.162	0.0077	87.0	12,500	45
46	*Artocarpus heterophyllus* ...	Sangka (fruit)	85.5	2.2	0.6	0.2	10.3	1.2	9	0.105	0.010	0.120	0.012	10.2	400	46
47	*Limnocharis flava*	Paku rawan	95.0	1.0	1.6	0.5	1.0	0.4	13	0.077	0.032	0.112	0.00536	41.7	4,320	47
48	*Phaseoleus speciosus*	Kantan	89.3	1.6	1.4	1.2	1.4	5.7	40	0.091	0.015	0.051	0.00338	14.2	1,350	48
49	*Musa sapientum*	Jantung pisang	87.1	1.4	1.9	1.0	1.5	7.6	48	0.206	0.021	0.084	0.00019	7.0	600	49
50	*Dioscorea alata*	Ubi nasi (root)	66.1	0.8	1.9	0.2	0.6	[illegible]	134	0.077	0.027	0.112	0.00263	10.2	100	50
51	*Monochoria hastata*	Kélayar	95.1	1.5	1.6	0.1	1.3	0.6	9	0.216	0.012	0.085	0.0217	27.2	11,100	51
52	*Commelina undiflora*	Rumput aur	85.2	3.4	2.7	0.2	2.6	6.9	37	0.137	0.028	0.092	0.00137	93.0	9,500	52
53	*Colocasia esculenta var. euchlora*	Kémahang	96.4	0.6	0.6	0.2	0.7	1.5	10	0.091	0.011	0.026	0.00062	6.2	250	53
54	*Colocasia esculenta*	Keladi (young leaf) ...	86.2	1.4	3.4	0.1	1.1	7.8	47	0.273	0.016	0.104	0.00793	31.0	11,200	54
54a	*Colocasia esculenta*	Keladi (old leaf) ...	81.7	1.9	3.4	0.2	1.9	10.9	60	0.436	0.015	0.127	0.00139	37.2	16,500	54a
54b	*Colocasia esculenta*	Keladi (stalk)	92.8	0.6	0.3	0.2	0.7	5.4	25	0.163	0.005	0.061	0.0019	5.0	180	54b
55	*Colocasia gigantea*	Lambok	95.8	0.7	0.4	0.1	0.6	2.4	12	0.165	0.006	0.036	0.00094	5.1	300	55
56	*Xanthosoma sagittifolium* ...	Keladi télur (root) ...	71.3	1.3	1.1	0.2	0.5	25.6	111	0.026	0.019	0.086	0.002164	7.6	70	56
57	*Luffa spinosa*	Gélégél	92.2	1.0	2.1	0.2	0.9	3.4	25	0.191	0.031	0.079	0.00117	15.5	4,604	57
58	*Zizania latifolia*	Rebung ayer	85.7	0.4	2.0	0.3	1.0	10.6	51	0.056	0.003	0.065	0.00096	9.0	200	58
59	*Gnetum Gnemon*	Belinjau	84.2	1.5	5.1	0.4	3.8	4.5	43	0.315	0.059	0.151	0.00105	24.0	0,500	59
60	*Diplazium esculentum*	Paku	89.6	1.8	1.6	0.2	1.3	5.5	31	0.131	0.015	0.156	0.0018	39.6	2,250	60
61	*Stenochlaena palustris* ...	Paku merah	90.4	0.9	2.4	0.1	2.5	3.7	26	0.061	0.020	0.065	0.00119	42.8	8,700	61
62	*Marsilea minuta var. Zollingeri*	Tapak itik	90.0	5.1	3.3	0.2	0.9	0.5	17	0.822	0.393	0.249	0.1154	46.0	8,100	62

Table 19. Nutritional Aspects of the Philippine Tasaday Diet (Robson and Yen, 1976)

TABLE I

Plants providing fruits and flowers consumed by Philippine Tasaday

Tasaday Name	Family	Genus
atas lulut[a]	MARANTHACEAE	*Plagiostachys*
balaeel in malagilan[a]	URTICACEAE	*Leucosyke*
balung awag	MELATOSTOMATACEAE	*Melatostoma*
bagi[a]	AMARYLLIDACEAE	*Curculigo*
baligawagan	ACTINIDIACEAE	*Saurauia*
baiwawag dak I	ACTINIDIACEAE	*Saurauia*
basikan atas	MORACEAE	*Ficus*
balosinoy[a]	BURSERACEAE	*Aglaia*
budukan[a]	ACTINIDIACEAE	*Saurauia*
dalikan[a]	ZINGIBERACEAE	*Amomum*
fonalon[a]	ZINGIBERACEAE	*Amomum*
fuyas	ARACEAE	*Scissmatoglottis*
kanae mean[a]	EUPHORBIACEAE	*Aporosa*
kajoe[a]	BALSAMINACEAE	*Impatiens*
kolo	ZINGIBERACEAE	*Phaeomeria*
lafinit[a]	PALMAE	*Calamus*
liguon	ACTINIDIACEAE	*Saurauia*
lugurit[a]	MORACEAE	*Ficus*
mata usa[a]	BURSERACEAE	*Canarium*
maziagan[a]	ZINGIBERACEAE	*Alpinia*
melafakid[a]	SAPOTACEAE	*Palaquium*
mogisalawa[a]	MELATOSTOMATACEAE	*Melatostoma*
oga[a]	MUSACEAE	*Musa*
salanay[a]	PALMAE	*Calamus*
sufin sufin	PALMAE	*Calamus*
syal dakal	DILLENIACEAE	*Dillenia*
tafiolay	ACTINIDIACEAE	*Saurauia*
tanto[a]	ROSACEAE	*Rubus*
tselin[a]	ZINGIBERACEAE	*Amomum*
tule[a]	ZINGIBERACEAE	*Amomum*

[a]denotes plants harvested for fruit alone; + for flowers only. Unmarked signifies that both flowers and fruits are eaten.

Source: Yen and Gutierrez (1975).

Table 20. Wild Edible Plants Utilized by the Tinguian, Philippines (Cole, 1922)

Latin Terminology	Tinguian Terminology
Bixa orellana	Apang/ Sapang
Antidesma ghesiembilla	Alloseup
Psidum guayava	Bayabas
Phaseolus mungo	Balatong
Pithecolobium dulce	Damokes
Psophocarpus tetragonolobus	Ipako
Allium tricoccum	Kochai
Sesbania grandiflora	Katodai
Allaeanthus luzonicus	Kama-al
Dioscorea daemona	Kalot
Colocasia antiquorum	Labok
Eugenia manbolana	Longboy
Cissus spp.	Olo

Table 21. Wild Plants Consumed by the Mansaka, Philippines (Abrams, 1961)

Latin Terminology	Portion Used
Pisonia umbellifera	Berk
Areca catechu	Nut
Eucalyptus spp.	Seed
Gnetum gnemon	Fruit
Caryota cumingii	Fruit
Saccharum spontaneum	Stalk
Diplodiscus paniculatus	Fruit
Psidium guajava	Fruit
Persea spp.	Fruit
Lansium domesticum	Fruit

Table 22. Wild Plants Consumed by the Tiruray, Philippines (Schlegel and Guthrie, 1973)

TABLE I
Plant foods of Tiruray

Tiruray name	English name	Sources Wild (W) Domesticated (D) or Planted (P) Tiruray	Kalinawa Peasant	Use	Average size of single portion	Portions throughout year Sita (Traditional)	Bekay (Peasant)
alus	a bamboo	W	W	young shoots are eaten	200 g	2	8
agum	[illegible]	W	W	young leaves are eaten	70 g	22	34
babasal (fruit)	squash	D	D	fruit is eaten	240 g	10	67
babasal (leaves)	squash	D	D	young leaves are eaten	70 g	—	3
badas	jackfruit	D	D	fruit is eaten	225 g	2	30
bunar	Palmyra palm	W	W	palm heart is eaten	210 g	22	—
bana	long beans, asparagus beans	D	P	pods and seeds are eaten	40 g	17	39
bans	a wild palm tree	W	W	palm heart is eaten	200 g	*	—
bawang	garlic	D	P	used for flavoring only	trace	12	15
bayabanu	tamarind	D	D	fruit is eaten	[illegible] g	12	—
bayabas	guava	D	D	fruit is eaten	50 g	3	—
[illegible]	lemon grass	D	D	used for flavoring only	trace	41	—
[illegible]	mung bean	D	P	beans (not pods) are eaten	110 g	22	122
[illegible] kayew	pigeon pea	D	D	beans (not pods) are eaten	100 g	1	—
[illegible]	common bean (white and red)	D	D	beans are eaten	100 g	4	—
bungan (fruit)	coconut	D	D	soft white flesh from young fruit is eaten	45 g	26	28
bungan (milk)	coconut milk	D	D	flesh is grated and squeezed with water to yield an oily white milk which is used as a broth to cook vegetables	120 g	61	547
bungan (oil)	coconut oil	D	D	the milk (see previous entry) is boiled until it becomes oil and is used as a cooking oil	trace	26	14
bunangkut	pomelo	D	D	yellow flesh is eaten raw or in oranges	25 g	10	—
dalf	a fungus	W	W	flesh is boiled and eaten	20 g	11	—
farow	a fern	W	W	fronds are eaten	15 g	4	—
fasu	rice	D	D P	grain is boiled and eaten	425 g	321	720
fenua	snake gourd, ampalaya	D	D	fruit and leaves are eaten	10 g	—	4
fenua uwak	wild ampalaya	W	W	fruit and leaves are eaten	10 g	2	—
fulsu	a plant similar to taro	W	W	young leaves are eaten	10 g	3	—
gas	ginger	D	P	used for flavoring only	trace	3	14
kafuta	papaya	D	D	if mature, fruit is eaten; if young, it is cooked and eaten as a vegetable	150 g	17	41
kafe	coffee	D	P	beans are boiled and drunk	200 ml	63	376
kalamundang	calamansi	D	D	juice is used as a spice	trace	5	—
kalanunggay	a tree	D	D	the young leaves are eaten	15 g	4	—
kamas	corn	D	D	kernels are eaten as grits or on the cob	250 g	120	68
kamangkis	tomato	D	D	fruit is eaten with other vegetables	5 g	12	426
kangkung	wild square stem fly bind	W	W	young leaves are eaten	70 g	5	54
kelimbug	a tree	W	W	fruit from flour and green in coconut is eaten	70 g	1	—

TABLE 22 (CONTINUED)

TABLE I—*Continued*

Tinuay name	English name	Sources: W (Wild), Domesticated (D) or Purchased (P) — Fiel (Traditional)	Kabakana (Peasant)	Use	Average size of single portion	Portions throughout year — Sila (Traditional)	Bekey (Peasant)
[illegible]	turmeric	W	D	used for flavoring only	trace	2	1
[illegible]	a small palm	W	W	the bud is eaten	25 g	5	—
[illegible]	jute	W	W	the young leaves are eaten	15 g	7	—
[illegible]	okra	D	D	fruit is eaten	60 g	—	4
[illegible]	common gourd	D	D	flesh is eaten	200 g	—	13
[illegible]	onion, leek	D	D	stalk is eaten	5 g	39	641
[illegible]	a legume similar to mungo bean	W	W	pods and seeds are eaten	100 g	1	—
[illegible] (tops)	taro	D	P	young leaves are eaten	50 g	9	20
[illegible] (tubers)	taro	D	P	tubers are eaten	70 g	6	2
[illegible]	sesame	D	D	seeds are toasted, powdered and eaten with rice	20 g	3	—
[illegible]	a herbaceous vine	D	D	the leaves are eaten	50 g	4	—
[illegible]	sugar cane	D	D	peeled and chewed for the juices	40 g	113	—
[illegible]	peanut	D	D	nuts are shelled and eaten	60 g	1	—
[illegible]	mango	D	D	fruit is eaten	50 g	5	—
[illegible]	a tree	W	W	brown fruit somewhat similar to an onion is eaten	30 g	1	—
[illegible]	a rattan	W	W	the heart is eaten	30 g	15	—
[illegible]	a mushroom	W	W	flesh is sliced and eaten	50 g	4	15
[illegible]	[illegible] mustard	D	P	the [illegible] are eaten	70 g	—	31
[illegible] (blossom)	[illegible]	D	D	the [illegible] is eaten	40 g	3	32
[illegible]	banana	D	D	the fruit is eaten	80 g	141	149
[illegible] (stalks)	banana	D	D	the heart of the stalk is eaten	40 g	1	—
[illegible]	sponge gourd, patola	D	D	the fruit and leaves are eaten	50 g	9	22
[illegible]	eggplant	D	D	the fruit is eaten	65 g	127	115
[illegible]	chili pepper	D	P	the fruit and leaves are eaten	40 g	—	4
[illegible]	a tree	W	W	fruit (seeds) similar to jackfruit) is eaten	50 g	1	—
[illegible]	cucumber	D	D	fruit is eaten	50 g	11	—
[illegible]	a tree	W	W	green colored fruit is eaten	35 g	1	—
[illegible] (tops)	sweet potato	D	P	leaves are eaten	50 g	30	19
[illegible] (tubers)	sweet potato	D	P	tubers are eaten	100 g	159	107
[illegible]	manioc	D	P	tubers are eaten	100 g	93	92
[illegible]	tuber yam	W	W	tubers are eaten	60 g	1	—
[illegible]	a tree	W	W	fruit (similar to jackfruit) is eaten	50 g	1	—

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Table 23. Common Edible Seaweeds from the Philippines (Bersamin et al., 1961)

Latin Termiology	Local Terminology
Acanthopora spicifera	Culot
Caulerpa racemosa	Lato
Caulerpa racemosa uvifera	Ar-arusip
Caulerpa serrulata	Galgalacgac
Caulerpa sertularioids	Salsalamagui
Codium muelleri	Pokpoklo; Sinling Siling
Gracilaria confervoides	Gulaman; Guramam; Gulaman-Dagat
Gracilaria eucheumoides	Kawat-kawat
Hydroclathrus clathratus	Balbalulang
Laurencia papillosa	Tartariptip
Porphyra spp	Gamet
Sargassum siliquosum	Aragan

Table 24. Nutritional Composition of Selected Wild Philippine Fruits (Francisco and Wester, 1930)

TABLE 1.—*Composition of some Philippine fruits.*

Name of fruit.	Average weight.	Weight of edible portion.	Moisture.	Ash.	Protein.	Sugars.		Ether extract.	Crude fiber.	Acidity as tartaric acid.	Other carbohydrates.	Calories value per 100 grams.
						Sucrose.	Reducing.					
	g.	*g.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	
Kopsma polyrrhoindes C. B. Rob.	3.1	.....	87.23	0.41	0.78	.....	2.17	1.31	1.56	2.13	3.30	49.71
Canarium ovatum Lam.	4.3	.....	53.73	0.83	1.16	.....	9.65	2.24	1.15	.17	.73	72.91
Lansium ovatum A. DC	70.16	63.75	62.19	0.11	1.14	.....	9.10	1.18	1.29	.....	21.99	103.71
Nephelium mamlai Blanco	29.20	6.0	84.34	0.15	0.92	.....	0.29	0.55	0.16	0.66	4.66	61.73
Cubilia bicolor Blanco	13.5	.....	60.43	1.29	3.31	.....	.....	4.12	2.48	.....	28.10	194.46
Mangifera rama Joce.	334.0	.....	82.73	0.46	1.39	.....	6.25	0.29	0.67	0.76	7.25	42.31
Artocarpus odoratissima Blanco	671.9	.....	81.23	0.51	1.47	4.37	6.17	0.23	0.77	0.18	2.67	43.62
Garcinia celebrica (Linn.) Merr.	4.5	.....	45.06	1.35	3.96	.....	.....	0.12	1.14	.....	48.37	223.31
Momordica cochinchinensis (Lour.) Spreng.	326.0	210	92.6	0.41	0.87	.....	Trace	0.48	0.96	.....	4.70	31.16
Artocarpus elasticus Reinw.	260.00	.....	84.11	0.63	1.62	.....	7.24	0.27	0.92	0.30	4.81	63.26
Mangifera odorata	175.0	72.0	79.72	0.42	0.83	11.21	5.90	0.25	0.41	0.06	.10	79.81
Mangifera indica var.	189.5	68.0	79.74	0.30	0.33	7.42	6.43	0.31	0.48	0.33	4.47	91.49
Anona sp.	180.0	715.0	71.68	0.75	1.67	7.96	12.92	0.48	0.65	.....	5.60	114.29

TABLE 2.—*Composition of some Philippine bananas.*

Name of fruit.	Average weight.	Weight of edible portion.	Moisture.	Ash.	Protein.	Sugars.		Ether extract.	Crude fiber.	Acidity as tartaric acid.	Other carbohydrates.	Calories value per 100 grams.
						Sucrose.	Reducing.					
Bananas	*g.*	*g.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	
Puti	27.3	32.4	73.82	0.65	1.22	6.73	15.97	0.48	0.39	.....	2.18	106.91
Tayabas	22.3	26.0	73.89	0.83	1.01	5.32	17.42	0.25	0.26	.....	3.99	117.25
Cenorobobo	53.3	30.0	66.51	0.74	1.27	.....	20.23	0.53	0.41	.....	9.49	133.38
Kalabo	106.4	42.0	68.21	0.81	0.89	0.48	23.50	0.33	0.41	.....	8.81	129.72
Lacop	81.4	31.0	69.63	0.99	1.03	9.08	14.11	0.34	0.32	.....	4.10	121.92

Table 25. Mineral Composition of Selected Wild Philippine Plants (Maranon, 1935)

Sample No.	Common name of plant.	Moisture.	Ash in— Fresh sample.	Ash in— Moisture-free sample.	Phosphorus (P_2O_5) in— Fresh sample.	Phosphorus (P_2O_5) in— Moisture-free sample.	Phosphorus (P_2O_5) in— Ash.	Calcium (CaO) in— Fresh sample.	Calcium (CaO) in— Moisture-free sample.	Calcium (CaO) in— Ash.	Iron (Fe_2O_3) in— Fresh sample.	Iron (Fe_2O_3) in— Moisture-free sample.	Iron (Fe_2O_3) in— Ash.	Ratio CaO:Fe_2O_3.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
8	Himbabao	71.60	2.83	11.06	0.29	1.67	13.21	0.41	1.53	14.35	0.030	0.12	1.03	1:0.9
19	Sikupas	90.15	0.90	9.16	0.19	1.69	18.46	0.16	1.61	17.61	0.011	0.11	1.23	1:0.6
60	Cosol	87.96	1.18	9.73	0.07	0.61	6.50	0.22	1.81	18.52	0.013	0.08	0.92	1:0.3
87	Leek	90.66	0.78	8.31	0.11	1.13	14.13	0.10	1.93	12.35	0.008	0.06	0.67	1:1.1
15	Basong	91.01	1.21	13.74	0.16	1.83	13.25	0.13	1.43	10.26	0.007	0.09	0.58	1:1.2
18	Kurkas	90.57	1.45	16.09	0.15	1.76	10.81	0.14	1.55	9.61	0.012	0.16	0.86	1:1.1
133	Kadapa	85.36	2.74	16.09	0.21	1.40	7.47	0.62	3.57	13.10	0.009	0.05	0.32	1:0.4
102	Haba	90.51	2.20	13.18	0.17	1.65	8.39	0.32	2.92	14.71	0.017	0.15	0.77	1:0.6
1	Kulitis	67.13	2.10	19.61	0.21	1.39	10.11	0.39	3.63	19.50	0.015	0.12	0.65	1:0.8
128	Nasep	71.30	1.10	4.26	0.27	1.03	24.11	0.05	0.19	4.11	0.025	0.10	2.23	1:3.6
9	Kinchay	86.08	2.06	11.71	0.16	1.12	7.61	0.31	2.65	16.63	0.015	0.11	0.71	1:0.0
60	Celery, kitchen root	94.16	0.84	14.36	0.16	1.76	12.11	0.06	1.03	7.57	0.003	0.05	0.35	1:1.6
23	Pako	93.59	1.32	13.15	0.26	2.66	19.46	0.03	0.25	1.89	0.006	0.06	0.47	1:19.2
11	Libbata	90.50	1.53	16.00	0.11	1.51	7.37	0.32	3.33	20.96	0.017	0.18	1.03	1:0.8
16	Alibangbang	91.16	1.02	6.63	0.10	1.01	17.96	0.06	0.37	6.50	0.011	0.65	1.37	1:2.7
64	Namalacha	87.91	2.71	22.10	0.15	1.27	6.45	0.38	3.17	14.15	0.035	0.27	1.22	1:0.6
175	Do.	96.03	0.83	21.01	0.05	1.24	6.19	0.02	0.52	2.43	0.006	0.18	0.68	1:2.6
316	Swiss chard	91.63	1.62	20.27	0.07	0.73	3.58	0.29	3.16	15.49	0.013	0.15	0.73	1:0.1
10	Petsay	93.43	1.16	18.20	0.11	1.74	9.66	0.30	4.65	25.52	0.040	0.15	0.81	1:0.4
6	Mustasa	91.01	1.44	15.96	0.29	2.22	13.53	0.22	2.47	15.90	0.011	0.14	1.16	1:0.9
237	Do.	90.81	1.76	18.94	0.17	1.50	10.05	0.39	3.33	17.62	0.020	0.22	1.17	1:0.6
189	Rutabaga	88.66	1.33	11.77	0.24	2.12	15.06	0.36	2.37	25.27	0.023	0.20	1.63	1:0.7
4	Kalee	86.70	1.86	14.54	0.19	1.57	10.07	0.66	5.01	30.67	0.016	0.18	0.87	1:0.3
67	Coliflor	92.21	1.07	13.81	0.15	2.02	14.56	0.68	1.03	7.26	0.043	0.06	0.30	1:2.0
211	Do.	90.76	1.07	11.62	0.18	1.95	16.00	0.07	0.71	6.15	0.002	0.03	0.25	1:2.7
30	Batao	90.02	0.69	6.87	0.12	1.22	17.72	0.06	0.51	7.41	0.003	0.03	0.50	1:2.6
31	Okra	89.39	0.89	7.31	0.11	1.27	17.31	0.07	0.90	12.24	0.072	0.42	0.31	1:1.6
37	Upo	95.09	0.54	11.23	0.03	0.81	6.16	0.05	1.11	4.62	0.003	0.07	0.32	1:0.7
148	Do.	97.67	0.29	12.01	0.02	0.79	6.47	0.02	0.51	4.25	0.005	0.13	1.41	1:1.3
129	Do.	96.06	0.51	13.23	0.37	1.81	13.36	0.03	0.09	5.40	0.002	0.05	3.25	1:2.3
842	Do.	97.67	0.29	13.06	0.07	3.12	23.43	0.03	1.20	9.85	0.001	0.04	0.22	1:2.6
143	Patolang bilog	96.95	0.60	14.63	0.12	2.36	19.90	0.03	0.41	4.32	0.006	0.09	0.42	1:1.6
141	Do.	95.96	0.63	11.59	0.11	2.33	17.21	0.04	0.81	6.01	0.003	0.06	0.41	1:2.9
83	Kamatis	94.62	0.57	11.56	0.05	0.36	0.91	0.01	0.31	2.91	0.003	0.06	0.86	1:3.1
192	Do.	93.11	0.73	10.56	0.11	1.51	18.27	0.03	0.50	4.69	0.005	0.07	0.48	1:1.3
229	Do.	91.41	0.54	10.36	0.08	1.47	14.19	0.01	0.12	1.19	0.002	0.03	0.22	1:11.0
12	Ampalaya	91.56	0.66	11.76	0.04	1.38	11.78	0.02	0.20	3.36	0.002	0.06	0.22	1:3.5
101	Malunggay	90.31	1.69	16.15	0.19	1.53	13.23	0.31	0.16	0.31	0.005	0.05	0.36	1:10.1
272	Retusa	92.35	1.18	[illegible]	0.13	1.95	13.59	0.04	0.43	3.22	0.005	0.07	0.43	[illegible]
214	Saba	22.43	1.27	[illegible]	0.25	2.62	11.92	0.43	0.03	2.26	0.004	0.28	0.31	1:5.1
323	Tuba	94.30	0.35	6.63	0.21	1.50	21.09	0.06	0.26	4.00	0.004	0.03	0.43	1:4.1
327	Sinkamas	89.21	0.91	7.19	0.12	1.31	16.27	0.11	0.33	13.37	0.001	0.03	0.48	1:1.1
65	Granadilla	91.91	0.25	3.79	0.04	0.53	9.26	0.04	0.45	7.72	0.003	0.06	0.20	1:1.2
26	Habichuelas	91.51	0.51	6.31	0.20	1.21	19.25	0.06	0.73	11.77	0.002	0.02	0.34	1:1.6
42	String beans	93.53	0.64	7.24	0.12	1.34	10.81	0.03	1.01	13.94	0.006	0.01	0.08	1:1.3
337	Dwarf wax beans	92.67	0.67	9.42	0.16	2.01	23.53	0.09	1.01	12.65	0.003	0.04	0.33	1:2.0
339	Wonder beans	85.91	1.30	10.35	0.25	1.91	19.16	0.12	0.52	0.74	0.009	0.09	0.72	1:2.9
78	Wax beans	92.36	0.96	13.60	0.19	1.40	10.74	0.09	1.20	9.71	0.000	0.11	0.44	1:1.1
145	Bush wax beans	92.43	0.53	7.10	0.12	1.45	23.24	0.06	0.94	12.72	0.006	0.06	1.16	1:1.8
147	Shorter beans	93.66	0.89	7.73	0.10	1.53	21.70	0.13	1.25	14.75	0.065	0.05	0.61	1:1.3
22	Chicaro	83.76	1.16	6.72	0.21	1.62	24.07	0.12	0.61	10.12	0.064	0.03	0.81	1:2.7
31	Do.	84.72	1.10	6.43	0.25	1.35	23.73	0.17	0.92	15.33	0.053	0.03	0.43	1:1.8
74	Chinese peas	87.49	0.81	6.11	0.22	1.59	23.82	0.15	1.23	18.05	0.005	0.21	3.59	1:1.3
836	Cigarillas, sigarilyas	75.22	1.86	7.76	0.06	0.21	3.11	0.33	1.37	17.56	0.017	0.07	0.92	1:0.2
71	Chayote	95.06	0.24	4.60	0.06	0.49	13.30	0.35	0.70	11.63	0.001	0.02	0.33	1:1.7
803	Katuray	76.61	0.29	3.22	0.05	0.48	14.13	0.10	0.34	5.24	0.013	0.11	2.68	1:2.9
32	Talong	92.47	0.37	4.05	0.11	1.26	16.60	0.03	0.29	3.62	0.002	0.03	0.41	1:4.4
40	Do.	78.19	0.86	7.12	0.07	1.22	12.76	0.03	0.46	5.16	0.002	0.05	0.37	1:2.8
912	Do.	90.73	0.81	10.22	0.17	1.62	15.70	0.01	0.22	2.19	0.001	0.02	0.23	1:7.2
62	Do.	92.43	0.71	9.92	0.07	1.21	12.37	0.03	0.43	4.41	0.003	0.06	0.45	1:1.0
779	[illegible]	70.47	1.41	6.62	0.14	0.61	11.77	0.32	1.03	22.81	0.001	0.01	0.32	1:9.5
20	Ampalaya	86.48	2.84	18.77	0.19	1.37	7.32	0.19	0.36	23.23	0.064	0.67	2.22	1:9.0
831	Bayag-bayag	81.62	1.48	7.53	0.23	1.62	21.41	0.69	0.65	6.19	0.016	0.07	0.56	1:1.0
60	Malunggay	79.19	2.81	13.66	0.21	1.16	1.82	0.78	3.67	23.62	0.146	0.02	3.92	1:4.3
821	Tabia	97.18	0.57	22.17	0.05	1.05	9.21	0.07	0.22	1.16	0.008	0.15	0.57	1:7.0
23	Pesud	62.56	2.77	13.93	0.23	1.29	8.12	0.63	2.73	17.25	0.033	0.23	1.42	1:1.6
838	Kopian	86.46	1.04	11.23	0.23	1.36	12.33	0.22	1.43	13.56	0.011	0.30	0.35	1:1.0
187	Pakowod	82.91	2.33	13.47	0.22	1.29	9.60	0.27	1.26	9.67	0.013	0.09	0.23	1:1.0
915	Japanese pumpkin	86.16	2.29	15.69	0.21	1.07	7.67	0.33	2.64	25.29	0.021	0.17	1.15	1:3.3
833	[illegible]	97.27	1.09	22.75	0.15	1.67	7.23	0.16	2.31	9.74	0.337	0.19	0.82	1:2.7
81	Water cress	92.23	1.19	15.51	0.11	2.13	11.71	0.11	1.43	11.29	0.015	0.23	1.22	1:1.2
3	Garden rhubarb	91.11	1.74	17.57	0.16	1.03	3.56	0.21	0.63	31.23	0.129	0.06	0.45	1:1.2
89	Indian spinach	91.76	2.77	21.42	0.14	1.92	7.31	0.27	1.60	6.22	0.013	0.22	0.19	1:1.2
132	Chayote	94.66	4.29	16.73	0.23	2.31	22.15	0.42	0.90	6.03	0.092	0.03	0.41	1:3.3
133	Amantes	91.75	1.04	12.64	0.06	1.23	10.15	0.56	3.48	39.45	0.029	[illegible]	0.49	1:0.3
53	American spinach	91.15	2.11	27.23	0.33	1.62	6.23	0.13	1.07	5.21	0.013	[illegible]	2.43	1:1.1
86	Philippine-leaved spinach	85.19	3.31	21.21	0.14	2.11	1.22	0.35	2.51	10.51	0.017	0.13	0.32	1:3.0
840	Camotes	92.12	1.73	[illegible]	0.23	0.32	12.23	0.18	2.14	20.21	0.013	0.25	2.73	1:1.6
172	Sampaga	92.80	0.77	4.59	0.23	1.21	[illegible]	0.06	0.22	6.60	0.011	0.52	0.67	1:5.8
46	New Zealand spinach	91.12	2.52	29.40	0.21	1.61	5.02	0.11	1.41	6.78	0.037	0.17	1.06	1:1.1
113	Tostas	93.36	2.64	21.25	0.12	1.70	6.30	0.15	1.24	5.52	0.007	0.13	2.51	1:1.1
332	Sweet potato leaves	92.13	1.12	11.24	0.17	3.15	21.26	0.69	1.21	0.62	0.311	0.11	1.22	[illegible]
83	Sitao	91.08	1.79	18.65	0.27	2.27	15.43	0.28	2.23	15.48	0.011	0.12	2.27	1:1.0

Table 26. Edible Wild Plants from the Philippines with Unusual Properties (Alejo et al., 1960)

Latin Terminology	Portion Consumed
Basella rubra	Shoots; Stems; Leaves
Momordica charantia	Fruit; Shoots
Anona reticulata	Fruit
Asystacia gangetica	Leaves; Flowers; Stems
Cajanus cajan	Pods; Stems; Fruits
Operculina turpethum	Leaves; Stems
Anachardium occidentale	Leaves; Fruits
Amaranthus viridis	Leaves
Alternanthera versicolor	Leaves
Sesuvium portulacastrum	Leaves; Stems
Allaenthus luzonicus	Flowers; Leaves
Moringa oleifera	Leaves; Flowers; Pods
Portulaca oleracea	Leaves; Stems
Chrysantemum coronarium	Leaves

Table 27. Wild Edible Vegetables Common to Manchuria (Baranov, 1967)

Plants Used During Famine and in Regular Times			
Plant names	Part edible	Season	Remarks
Polypodiaceae			
*1. *Dryopteris crassirhizoma* Nakai	lvs	sp	
Typhaceae			
2. *Typha latifolia* L.	y shts	sp	
3. *T. davidiana* Hand. Mzt.	y shts	sp	
Alismaceae			
4. *Sagittaria trifolia* L.	rhizome	f	C in S. China
Gramineae			
5. *Phragmites communis* Trin.	y shts	sp	
6. *Echinochloa crus-galli* (L.) Beauv. & Scl.	frts	a	
Commelinaceae			
7. *Commelina communis* L.	y lvs	sp	
Liliaceae			
8. *Asparagus dahuricus* Fisch.	y shts	sp	
*9. *Lilium dauricum* Ker.-Gawl.	bulbs	a	eaten fresh & dried in the winter
10. *L. pulchellum* Fisch.	bulbs	a	eaten fresh & dried in the winter
*11. *Fritillaria kamtschatcensis* (L.) Fisch.			
12. *Hemerocallis minor* Mill.	starchy corm	f	
13. *H. fulva* L.	lls	sum	delicacy
*14. *H. middendorffii* Tr. & Mey.	lls	sum	delicacy
*15. *Allium schoenoprasum* L.	lls	sum	delicacy
*16. *A. victorialis* L.	lvs	sp & sum	
17. *A. odorum* L.	y lvs	sp & sum	
18. *A. macrostemon* Bge.	lvs	sp & sum	
19. *A. senescens* L.	1. y pts; 2. bulbs	1. sp; 2. sum	
Ulmaceae			
20. *Ulmus pumila* L.	lvs	sp & sum	
Urticaceae			
21. *Urtica angustifolia* Fisch.	y frts	sum	bast also rarely eaten
Polygonaceae			
22. *Rumex acetosa* L.	y shts	sp	
23. *R. acetosella* L.	lvs	sp to a	
Chenopodiaceae			
24. *Chenopodium album* L.	lvs	sp to a	
25. *Ch. stenophyllum* Koidz.	lvs	sum	
26. *Ch. centrorubrum* Nakai	lvs	sum	
27. *Ch. urbicum* L.	lvs	sum	
28. *Kochia scoparia* Schrad.	lvs	sum	
Amaranthaceae			
29. *Amaranthus retroflexus* L.	y lvs	sum	
Portulacaceae			
30. *Portulaca oleracea* L.	lvs	sum	
Nymphaeaceae			
31. *Euryale ferox* Salisb.	shts	a	
Ranunculaceae			
*32. *Paeonia albiflora* Pall.	sts ?; sds	sum/a	C in S. China
33. *Caltha palustris* L.	sts	sp	
Berberidaceae			
*34. *Berberis amurensis* Rupr.	shts	sp	
Menispermaceae			
35. *Menispermum dauricum* DC.	lvs	sp	
Schizandraceae			
*36. *Schizandra chinensis* Baill.	y shts	sp	
Papaveraceae			
37. *Chelidonium majus* L.	lvs; frts	sum/a	
	lvs	?	irritant, purgative

TABLE 27 (CONTINUED)

WILD VEGETABLES OF THE CHINESE IN MANCHURIA

Plant names	Part edible	Season	Remarks
Cruciferae			
38. *Lepidium apetalum* Willd.	y pts	sp	
39. *L. ruderale* L.	y pts	sp	
40. *Capsella bursa-pastoris* Medic.	y pts	sp	
41. *Draba nemorosa* L.	y pts	sp	
Crassulaceae			
*42. *Orostachys spinosus* (L.) C.A.M.	fleshy lvs	?	
Saxifragaceae			
*43. *Astilbe chinensis* Maxim.	y shts	?	
Rosaceae			
*44. *Rubus crataegifolius* Bge.	y lvs; frts	sp & a	
Leguminosae			
45. *Melilotus suavcolens* Lalb.	y shts	sp	
*46. *Lespedeza bicolor* Turcz.	fls	late sum	rarely
47. *Caragana arborescens* Lam.	sds	a	C; introd. from Siberia
*48. *Lathyrus davidii* Hance	tips of shts	sum	
Balsaminaceae			
*49. *Impatiens noli-tangere* L.	lvs	sum	
Vitaceae			
*50. *Vitis amurensis* Rupr.	leaf stalks	sum	
Malvaceae			
51. *Abutilon theophrasti* Medic.	unripe sds	late sum	
Dilleniaceae			
*52. *Actinidia arguta* Planch.	y shts; frts	sp & a	
Hydrocaryaceae			
53. *Trapa amurensis* Flerov	sds	a	
54. *T. Komarovii* V.Vass.	sds	a	
Araliaceae			
*55. *Aralia continentalis* Kitag.	root; lvs	?	rarely
*56. *A. mandshurica* Rupr. & Max.	buds	sp	delicacy
Umbelliferae			
*57. *Pleurospermum kamtschaticum* Hoffm.	roots	?	
58. *Cicuta virosa* L.	y lvs	?	toxic
59. *Oenanthe javanica* (Blume) DC.	y shts	sum	delicacy
*60. *Aegopodium alpestre* Lalb.	y shts	sp	
*61. *Heracleum barbatum* Lalb.	sts & lvs	sum	
Asclepiadaceae			
62. *Metaplexis japonica* Makino	unripe frts	late sum	
Boraginaceae			
*63. *Brachybotrys paridiformis* Max.	y lvs	sp	
Labiatae			
64. *Stachys baicalensis* Fisch.	y lvs	sp	
65. *Leonurus sibiricus* L.	y lvs	sp	
66. *Elsholtzia patrini* (Lep.) Gareke	lvs	?	
*67. *Plectranthus excisus* Max.	y shts	?	
*68. *P. glaucocalyx* Max.	y shts	?	
Solanaceae			
69. *Solanum nigrum* L.	frts	a	
Plantaginaceae			
70. *Plantago major* L.	lvs	sp	
Caprifoliaceae			
*71. *Sambucus sp.*	y lvs	?	
Campanulaceae			
*72. *Adenophora verticillata* Fisch.	lvs	sp	
*73. *Campanula punctata* Lam.	lvs	sp	
Compositae			
74. *Artemisia dracunculus* L.	lvs	?	
75. *A. selengensis* Turcz.	y shts	sp	
*76. *Adenocaulon adhaerescens* Max.	y lvs	sp	
*77. *Cacalia hastata* L.	y lvs	sp	
78. *Arctium lappa* L.	root	?	
79. *Carduus crispus* L.	y pts	sp	
*80. *Ligularia speciosa* F. & M.	y shts	sp	
81. *Sonchus arvensis* L.	y pts	sp	
82. *Taraxacum variegatum* Kitag.	y pts	sp	
83. *T. brassicaefolium* Kitag.	y pts	sp	
84. *T. erythropodium* Kitag.	y pts	sp	
85. *T. pseudo-albidum* Kitag.	y pts	sp	

TABLE 27 (CONTINUED)

Emergency Plants

Plant Name	Part edible	Remarks
Liliaceae		
*1. *Allium monanthum* Maxim.	pts, whole	
2. *Asparagus* (2 spp.)	y shts	
3. *Lilium* (1 sp.)	bulbs	
*4. *Polygonatum officinale* All.	rhizome	toxic
Salicaceae		
5. *Populus pseudo-simonii* Kitag.	lvs	
6. *Salix triandra* L.	lvs	
7. *S. sungkiani* Chou et Skv.	lvs	
8. *S. pseudo-matsudana* Chou et Skv.	lvs	
Ulmaceae		
*9. *Ulmus macrocarpa* Hance	frts	
*10. *U. propinqua* Koidz.	lvs	toxic
Moraceae		
11. *Morus alba* L.	lvs, frts	
Urticaceae		
12. *Urtica cannabina* L.	lvs	
*13. *U. laetevirens* Max.	lvs	
Polygonaceae		
14. *Polygonum aviculare* L.	tips of shts	
15. *P. heterophyllum* Lindm.	tips of shts	
16. *P. rigidum* Skv.	tips of shts	
17. *P. orientale* L.	lvs	
18. *P. nodosum* Pers.	lvs	
19. *P. limosum* Kom.	tips of shts	
20. *P. divaricatum* L.	tips of shts	
Chenopodiaceae		
*21. *Kochia sieversiana* (Pall.) C.A.M.	tips of shts	
22. *Salsola mitherica* Iljin	seedlings	
23. *S. collina* Pall.	seedlings	
*24. *Suaeda corniculata* (C.A.M.) Bge.	sds	
*25. *S. heteroptera* Kitag.	sds	
Caryophyllaceae		
*26. *Gypsophila dahurica* Turcz.	root	toxic (saponine)
Cruciferae		
27. *Rorippa palustris* (Leyss.) Bess.	y sprouts	
Rosaceae		
28. *Potentilla supina* L.	seedlings	
Leguminosae		
29. *Kummerovia stirinta* (Thb.) Schindl.	pts, whole	
Tiliaceae		
*30. *Tilia amurensis* Rupr.	lvs	
*31. *T. mandshurica* Rupr. & Max.	lvs	
Guttiferae		
*32. *Hypericum ascyron* L.	lvs	substitute for tea; toxic
Violaceae		
33. *Viola collina* Bess.	pts, whole	
34. *V. patrini* DC.	pts, whole	
35. *V. mandshurica* W. Bekr.	pts, whole	
36. *V. primulifolia* Bge.	pts, whole	
Onagraceae		
*37. *Chamaenerion angustifolium* (L.) Scop.	lvs	substitute for tea
Umbelliferae		
38. *Sphallocarpus gracilis* K.-Pol.	y pts	
Gentianaceae		
39. *Nymphoides peltatum* O. Ktze.	lvs	
Boraginaceae		
40. *Trigonotis peduncularis* Benth.	y pts	

TABLE 27 (CONTINUED)

Plant names	Part edible	Season	Remarks
Labiatae			
*41. *Lamium album* L.	y pts		
*42. *L. barbatum* S. & Z.	y pts		
*43. *Scutellaria baicalensis* Georgi	lvs		substitute for tea
44. *Lycopus lucidus* Turcz.	starchy tubers		
45. *Stachys sieboldii* Dge.	rhizome		
Plantaginaceae			
46. *Plantago depressa* Willd.	lvs		
Caprifoliaceae			
*47. *Lonicera* spp.	fls		substitute for tea
Valerianaceae			
48. *Valeriana* sp.	lvs		
49. *V. amurensis* Smirn. ex Kom.	lvs		
Compositae			
50. *Inula britannica* L. var. *japonica* Fr. & Sav.	y lvs		
51. *Cirsium setosum* Maxim.	tips of shts		
*52. *C. schantarense* Tr. & Mey.	tips of shts		
53. *Xanthium strumarium* L.	lvs		toxic
54. *Ixeris chinensis* Nakai ssp. *versicolor* Kitag.	y pts		
55. *Lactuca sibirica* Benth.	y pts		

Total: families, 23; genera, 26; species, 56.

Wild Vegetables of the Chinese in Manchuria

Abbreviations Used

*—forest plants of eastern Manchuria

C—cultivated
sp—spring
sum—summer
a—autumn

pts—plants
shts—shoots
sts—stems
lvs—leaves

fls—flowers
frts—fruits
sds—seeds
y—young

Unavailable Document

Table 28. Nutritional Composition of Selected Wild Edible Plants of China (Harris, et al., 1949)

TABLE 1

Composition of Chinese foods

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Apricot kernel (sweet)	Hsing jen (Tien)	Prunus armeniaca L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Chiao pai	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Dolichos Lablab L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	2.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Zea mays L.	[illegible]	[illegible]	1.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]											
[illegible]			[illegible]	2.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Momordica Charantia L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	0.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Phaseolus Mungo L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Phaseolus Mungo L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] L.	[illegible]	1.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

played by wild plants. Kim Tae Hee (1975) has reported on wild edible plants from Korea but we have been unable to review this work.

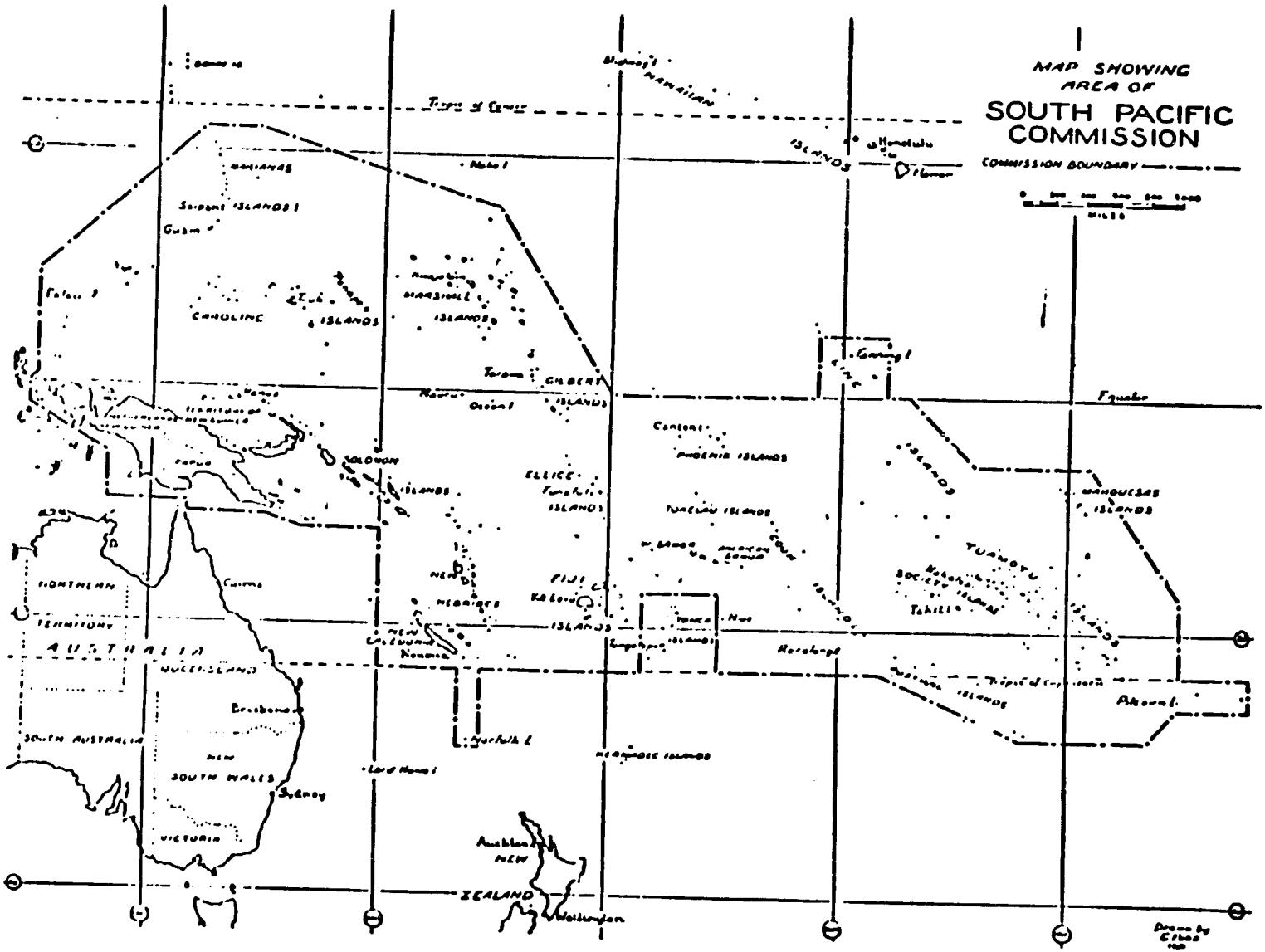
Oceania (Map 4)

Oceania, considered here to be the islands of the central and south Pacific, includes Melanesia, Micronesia, and Polynesia. Early accounts of the botany and food plants stem from Bennett (1832). Merrill (1945) described the plant life of the Pacific world and identified approximately 100 edible wild plants, all terms obtained from secondary source material. Elsewhere, Merrill (1947) assembled a major monograph on the botanical bibliography of the Pacific islands while Massal and Barrau (1956) discussed more than 260 species of edible plants, providing chemical and nutrient analysis, species keys, and general agricultural-cultural data (Table 29).

Other writers considering Oceania in general and its food plants include Murai et al. (1958) who provided nutritional data, descriptions of items, food history, and agricultural data on selected species, and Steiner (1961) with her extensive dictionary of vernacular terms used for food throughout the region. Barrau (1973) is among the more important writers who has used the plants of the South Pacific to reconstruct movements, migrations of peoples throughout the island groups. His work on this theme extends across several decades as seen in two additional accounts, Barrau (1965; 1961), and his tracing of subsistence agriculture throughout Micronesia and Polynesia comparing wild and introduced species (Table 30).

Authors focusing on specific plants throughout the region include Thieret and his survey of dietary use of cycads, noting there are 9 genera with more than 100 species serving throughout the south Pacific, central America, and southern Africa as a starchy dietary resource, specifically, Bowenia spectabilis, Cycas spp., Dioon spp., Encephalartos spp., and Macrozamia spp. Barrau (1959) and

MAP 4 OCEANIA



After Massal and Barrau (1956)

Koonlin (1979) have reviewed sago palm production (genus Metroxylon), its historical, ecological, and historical development, noting that food obtained from this wild palm provides the principal starch source (carbohydrate) for hundreds of societies. Soderstrom (1937), in his study of poi and other preserved vegetables throughout the Pacific basin, reported use of galip nuts (Canarium spp.) that are preserved by hanging for considerable time in the smokey interiors of houses or enclosed trees.

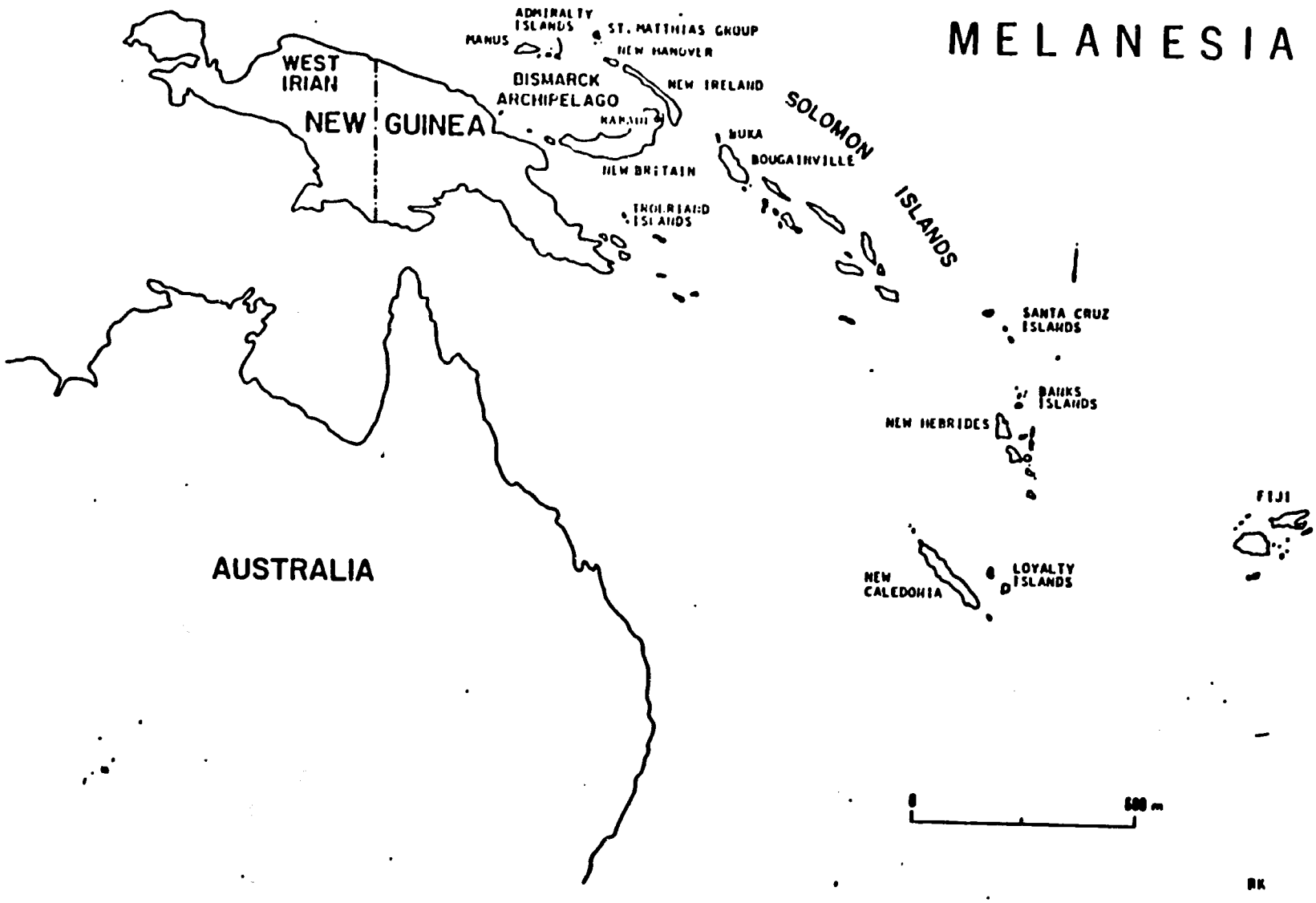
The theme of wild foods serving as emergency rations led to the development of at least two important monographs produced during the years of World War II. Merrill (1943) compared and contrasted the edible and toxic species throughout the Pacific basin while Cranwell et al. (1944) produced a basic guide to the edible, emergency foors of the western Pacific.

Peters (1957) collected data on the chemical composition of south Pacific foods with specific attention to the composition of edible wild plants. This work reveals, for example, that Brugulera eriopelia is high in protein, ash, and fiber; Metroxylon sagu is high in calories; Carica papaya leaves are high in protein; Ficus racemigera is high in vitamin A; Pandanus spp. is high in B-complex and C vitamins; Inocarpus edulis is low in fat but high in carbohydrate; Dammaropsis kingiana leaf is high in protein and vitamin A; Lumnitzera racemosa leaf is high in protein; Sesbania grandiflora leaf is high in protein, vitamins A and C; Tetragonia expansa leaf is high in vitamin A and protein; and Wedelia biflora leaf is high in protein.

Melanesia (Map 5)

Melanesia lies northeast of Australia and south of Micronesia. This island grouping includes the Bismarck archipelago, Solomon Islands, New Hebrides, New Caledonia, and the Fiji Islands. New Guinea, part of the Malay archipelago, will be considered within this island grouping.

MAP 5 MELANESIA



After Leber (1977)

New Guinea

Introduction to the botany of New Guinea may be obtained from Miklouho-Maclay (1885) who provided basic lists of plants used by natives along the Maclay coast with special reference to edible species, among them Artocarpus incisa, Artocarpus integrifolia, Barringtonia spp., Bassia cocco, Bassia maclayana, Canarium commune, Citrus spp., Mangifera indica, Pandanus spp., and Pangium edule. Work by Ryan (1972) provides lists of the major wild and domesticated foods used within New Guina (Table 31).

Warner (1962) reviewed sugar cane, an indigenous Papuan cultigen, that he suggests was domesticated first in New Guinea. Wild species of sugar cane still found throughout the region include Saccharum officinarum, S. barberi, S. edule, S. robusium, S. sinense, and S. spontaneum. The tuber Pueraria has attracted several writers, namely Watson (1964; 1968) and Strathern (1969), who have described this "lesser" root crop of the New Guinea highlands; several species are known Pueraria hirsuta, P. lobata, P. officinalis, and P. tuberosa. Loving (1976) described dietary use of bamboo by the Awa who use the shoots from Nastus elatus as a food staple.

Most of the information on edible wild plants in New Guinea is contained in excellent cultural monographs. Blackwood (1940), writing on the use of plants among the Kukukuku of southeast-central New Guinea, identified more than 50 edible wild species and noted that wild foods were the most important dietary elements (Table 32). Gitlow (1947), working among the Mount Hagen peoples, provided vernacular terms for edible stalks and wild greens. Meggitt (1958; 1960) studied the Enga of the New Guinea highlands noting 6 kinds of wild fruits; 10-15 kinds of edible fungi; 2 kinds of edible leaves; 2-3 cucumber-like plants; and 4 with edible seeds. The Enga, however, consider such wild foods

peripheral to their diet and are consumed in quantity only as emergency rations. Venkatachalam (1962) worked in the Chimbu region of the highlands and provided a basic overview of the diet, nutrition, and health of peoples in this area. Pospisil (1963a; 1963b) studied the Kapauku noting extensive use of edible wild plants, especially Eugenia spp., Pandanus conoideus, Garcinia spp., Oenanthe javanica, Rungia klosii, Syzygium aqueum; Syzygium pachyclada, Solanum nigrium, Rubus fraxinifolius. Cyathea spp., and Thelypteris spp. He noted, too, that the Kapauku maintained "kitchen gardens" containing a number of edible wild greens, among them Setaria palmaefolia, Solanum nigrum, Hibiscus manihot, Oenanthe javanica, and Rungia klosii.

Bulmer and Bulmer (1964) used edible wild and domesticated plants as evidence for their reconstruction of the prehistory of the Australian New Guinea highlands, noting widespread use of semi-cultivated wild species such as Pandanus jiulianetti, Pandanus brosimos, Pueraria lobata, Elaeocarpus sloanea, Finschia spp., and Sterculia, as well as numerous species of ferns, fungi, and wild tubers. Hipsley and Kirk (1965) worked among the Pari (high altitude society) and Kaporaka (lowland society) and provided data on their edible wild plant utilization (Table 33). Watson (1965) studied Agarabi society of the eastern highlands and noted that wild plants are widely used as food, especially grass, bamboo, bark, tubers, seeds, nuts, and flowers. Bailey (1966) working in Chimbu district of the eastern highlands, noted many indigenous wild greens, specifically Amaranthus, Hibiscus, and Rungia, contain more protein, iron, and calcium than domesticated cabbage or lettuce, and that various nuts such as Pandanus and Macaranga are available in great quantities seasonally.

Straatmans (1967) identified more than 185 edible wild species from New Guinea, noting 83 leaves and flowers used as food; 73 fruits and seeds; 12 tubers; 6 where the pith was consumed; 9 salt/ash substitutes; and 2 sugar substitutes. Clarke

(1968; 1971), writing on the Maring peoples of the Ndwimba basin (Bismarck Mountains region), identified more than 40 edible wild species (Table 34). Sorenson and Gajdusek (1969) working in the Fore region on nutrition and kuru identified extensive use of wild mushrooms, wild plams, bamboo, and wild breadfruit, and an important role for Coix gigantea in the production of ash for human salt production. Townsend (1971), studied the cultural ecology of sago gatherers along the Wogamus River, upper Sepik territory, noting the relationships between food intake, caloric return from sago, population density, and infanticide. She reports that up to 85% of the dietary intake may come from sago; 10% from meat (primarily from pigs, wild game, and insects); and 5% from wild/cultivated plants. (for an overview of the dietary utilization of insects as human food in New Guinea see Meyer-Rochow, 1973).

Hatanaka and Bragge (1973) worked among the Saiyolof of the New Guinea highlands, noting use of wild breadfruit (Artocarpus altilis) and seven kinds of Pandanus. Sterley (1974-75) identified 315 plants in the Chimbu region of Papua New Guinea of which 76 wild species were regularly consumed (Table 35). Du Toit (1975), investigated the Akuna and noted use of Chenopodium spp. and Setaria palmifolia, with extensive use of four wild mushrooms (Clitocybe spp., Pleurotus spp., Polyporus frondosus, and Polyporus sulfereus). Van Arsdale (1978), working among the Asmat, identified hunting, fishing, and sago-gathering traditions, while Lang (1979) wrote on the Marind-Anim and noted their use of wild sago.

The ecology of nutrition/malnutrition in New Guinea has been the focus of other monographs. Oomen (1971) provides a basic overview of dietary/nutritional status while Townsend (1974) documents the nutritional questions raised in sago production areas. Information on nutritional status has been reported by Oomen and Malcolm (1958) and the relative role played by wild and domesticated foods is

clearly outlined (Table 36). Townsend et al. (1973) reported the nutritional contributions of sago ash as a salt substitute in New Guinea, noting production from three plants as major importance (Athyrium esculentum, Coix gigantea koenig, and Mauritia flexuosa. They also report the dietary role of sago and of additional wild plants common throughout New Guinea (Table 37). Food composition tables specifically prepared for New Guinea have been produced by Bailey (1968) with care given to the analysis of selected wild plants -- with the warning that -- indigenous legumes may contain dangerous quantities of cyanogenetic lucosides and that many species must be processed before human consumption (Table 38).

Solomon Islands

Brookfield (1969), writing on the island of Guadlcanal in the Solomon Islands, noted extensive use of Asplenium esculentum, Barringtonia edulis, Canarium spp., and Hibiscus spp.

Pardge (1971), worked on Bellona Island of the British Solomon Island Protectorate and noted use of Dioscorea bulbifera as a famine food. A more complete description of wild foods used in the British Solomon Islands, however, is contained in Tedder (1973) who surveyed both wild and domesticated food resources (Table 39).

Yen (1974) described the edible wild and domesticated fruit trees on Santa Cruz, noting their spread and distribution as garden species throughout the south Pacific (Table 40).

Connell (1977) -- in a paper not seen -- has reviewed the hunting and gathering, forage economy of the Siwai of Bougainville, while Akimichi (1978), writing on the Lau of the Solomon Islands, describes their use of Canarium spp. and the seeds of mangrove species, especially Rhizophoraceae.

New Hebrides

Malcolm (1952), describing the nutritional status of the New Hebrides, reports extensive use of both wild and domesticated forms of breadfruit (Autocarpus communis), avacado pear (Persea americana), and citrus (Citrus spp.), with the notation that seaweed and ferns are occasional dietary items.

Muller (1975) worked among the Bunlap of New Hebrides and reported dietary use of five wild species, Barringtonia excelsa, Canarium spp., Dracontomelum sylvestre, Inocarpus edulis, and Tricosanthea spp.

New Caledonia

Barrau (1950) provided a checklist of the economic plants of New Caledonia with special reference to Pueraria thunbergiana and the various sago palms, cycads, and ferns. Malcolm (1953), describing the nutritional status of New Caledonia, cites use of edible wild plants, among them Colocasia spp., several ferns, wild cress (Nasturtium officinale), and a number of edible leafy species, used in salads, for example, Brassica campestris var. sinensis. Dubois (1971), working in New Caledonia reports an extensive number of edible wild plants consumed (Table 41).

Fiji

Botanical interest in Fiji extends more than a century with the pioneering work of Seemann (1865-1873), Flora Vitiensis, a survey of the botanical history and plant use of the Fiji islands (Appendix 17). More recent botanical investigations include those by Surridge and B.E.V. Parham (1941) on the leafy green vegetables of Fiji. Most of the work on Fiji ethnobotany, however, stems from the work of H.B. R. Parham (1939; 1940a; 1940b; 1940c; 1940d; 1941a; 1941b; 1941c; 1941d; 1943a; and 1943b). Throughout these monumental works are constant reference to edible species, among them Rhizophora mucronata, Bruguiera rheedii, Nephrodium spp., Fiscus pritchardii, Athyrium melanocaulon, Terminalia catappa, Cordyline terminalis, Athyrum esculentum, Litobruchia sinuata, Goncophlebrium subauriculatum.

More recently, J. W. Parham (1964) produced still another monograph on the plants of Fiji with short ethnobotanical notes for both wild and domesticated plants.

Micronesia (Map 6)

Micronesia lies east of the Philippines and north of Melanesia. It contains the Mariana, Marshall, Gilbert, and Caroline island groups. The major botanical accounts that deal with Micronesia in general stem from Fosberg (1946) and Fosberg and Sachet (1975). General use of Pandanus fruit as food throughout Micronesia has been studied by Miller et al. (1956) who provided extensive nutritional data on this important food resource, noting that it is high in calories, and vitamin A, with modest values for vitamin C, and that Pandanus pulposus contains little protein or fat, but has calcium and iron values equal to domesticated apricots or peaches (Table 42).

Gilbert Islands

Luomala (1953), writing on the ethnobotany of the Gilberts, reported data from Tabiteuea Island where Ficus tinctoria serves as an important famine food. She provides a checklist for all Gilbertese plants.

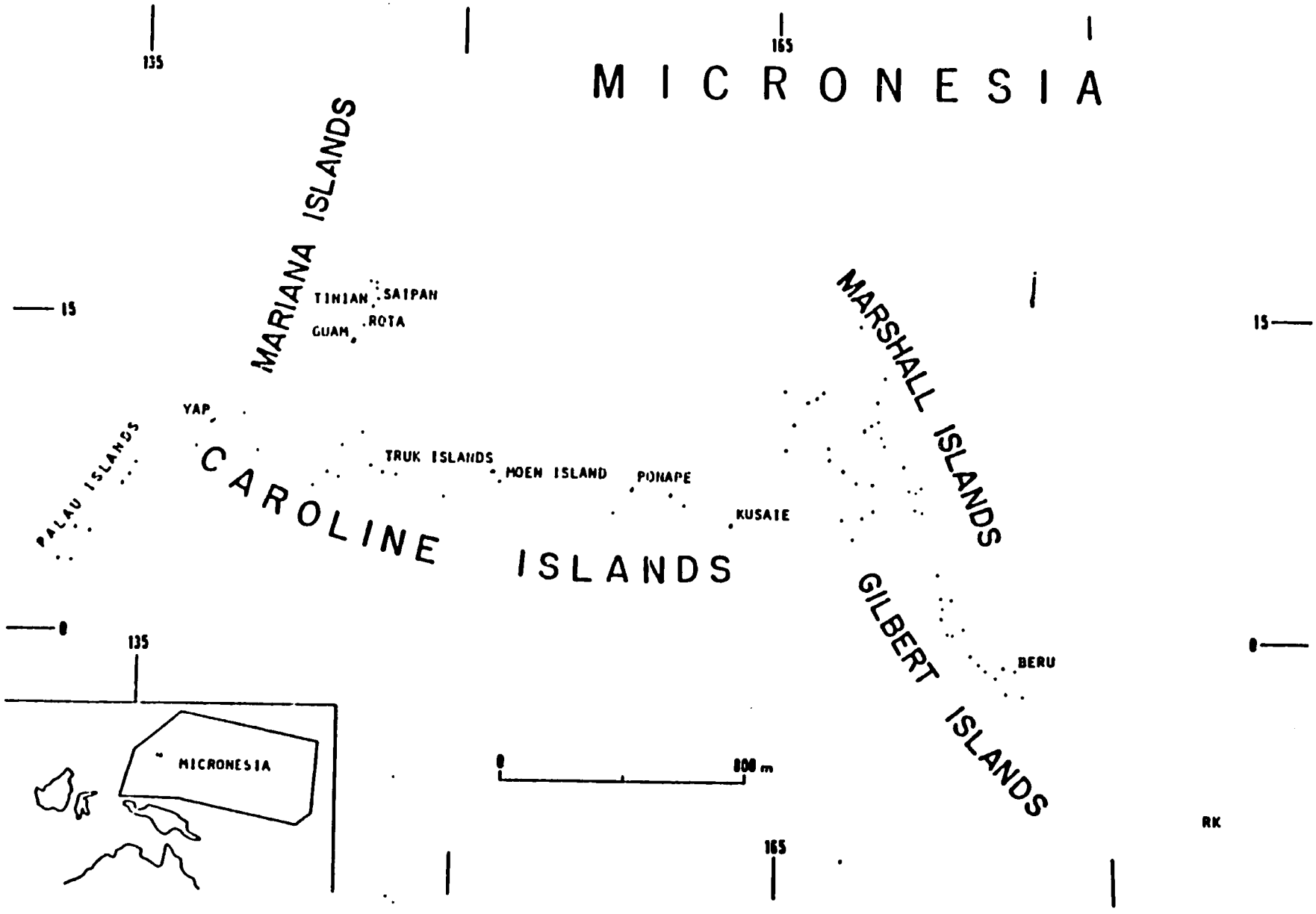
Marshall Islands

Spoehr (1949) mentions widespread use of Pandanus as an important dietary element, while Taylor (1950) provides a basic account of the botany of Bikini and other northern Marshall islands, with special attention to seaweeds and fungi, providing notes in passing on some edible species.

Mariana Islands

Safford (1905) produced a major monograph on the plants of Guam, with mention that numerous species were edible (Table 43). More recently, Malcolm (1958), writing on the diet of mothers and children on Guam, noted the presence of edible wild Ipomoea aquatica at the Agana market.

MAP 6 MICRONESIA



After Leber (1977)

Caroline Islands

St. John (1948) described the flora of Pingelap atoll in the Carolines noting use of wild Cocos nucifera, Tacca leontopetaloides, Leontice leontopetaloides, and Tacca pinnatifida.

Murai (1954) working on Truk, specifically Udot island, described use of wild Cyrtosperma chamissonis, Morinda citrifolia, and Dioscorea bulbifera as famine foods, as well as Ipomoea digitata, Spondias dulcis, Crataeva speciosa, and Terminalia catappa.

Malcolm (1955) conducted nutrition research on Yap and noted use of several wild plants, especially Inocarpus fagiferus, along with numerous edible wild leaves.

Wilson (1969), writing on the economic activities at Kusaie and Lelu islands in the Carolines, outlined the basic gathering economy practiced and noted the use of more than 21 species of wild plants (Table 44).

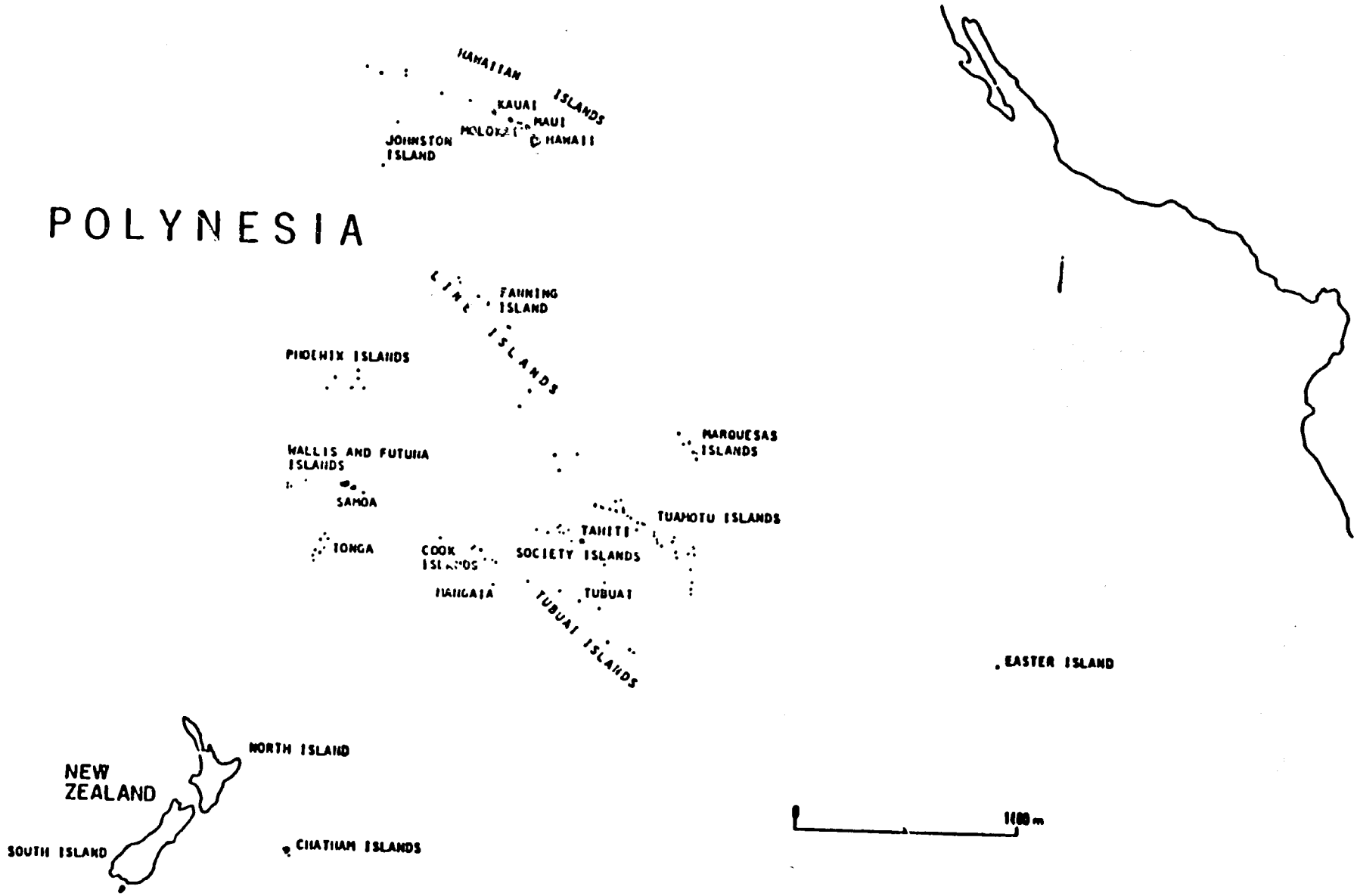
Polynesia, Australia, and New Zealand (Map 7)

Polynesia lies within the central and south Pacific, including Hawaii, the Line, Ellice, Phoenix, Tonga, Cook and Samoa, Easter Island, the group of French Polynesia, and New Zealand.

Samoa

Setchell (1924), writing on the vegetation of Tutuila island and the vegetation of Rose atoll, documented extensive dietary use of wild plants but provided vernacular names only. Buck (1930) noted Samoan use of seaweed (limu) as dietary staples for invalids and the elderly. Parham (1972) produced the basic ethnobotany of Samoa, providing local and scientific terminology for both domesticated and wild species. Cox (1980) described Samoan technology for processing of breadfruit and bananas, and provided data on their preservation.

MAP 7 POLYNESIA



After Leber (1977)

Pukapuka

Beaglehole and Beaglehole (1938) identified use of wild Pandanus and reported on methods of preparation, noting that the fruit is enjoyed by both adults and children and provides an important flavoring/sweetening component to local diet.

Uvea

Burrows (1938) writes that in some years of food shortages, especially after hurricanes, the residents burn the wild brush; wild arrowroot and wild yams are said to be the first plants to sprout after such fires, and so are easily gathered by the people as food. Kirch (1978) described the agro-ecological system of Uvea and mentioned dietary use of several wild plants, especially Inocarpus fagiferus, Pandanus spp., Pometia pinnata, and Spondias dulcis.

Tahiti

Knowledge of the botany of Tahiti stems from the early work of Butteaud (1891) on the economic plants of the island. Wilder (1928) has described utilization of wild breadfruit (Puero ovili = Uru ovili), while not widely esteemed, it is eaten during times of food scarcity. Grant et al. (1974) described the flora of the Society Islands and noted use of Vaccinium cereum a wild berry that is consumed as a famine food. Finney (1965) has written on economic development and dietary consequences among Tahitians (not seen by the present authors).

Hawaii

Most of the references to dietary use of wild plants in Hawaii stem from studies conducted on edible seaweeds. Reed (1906) provided the initial survey, noting the economic species and their relative food value, while more recent data by Abbott (1978) identifies more than 15 species regulary used as food, including Asparagopsis taxiformis, Enteromorpha prolifera, Gracilaria

coronopifolia, Laurencia nidifica, Graleloupia filicina, Lamanaria spp., Polyphyra spp., Codium spp., and Halymenia spp. Leber (1977; 1979) has completed an excellent monograph on human dietary utilization of seaweed -- not only for Hawaii but for Oceania and the Pacific basin countries, documenting use of several hundred species (Appendix 18).

Australia-New Zealand

Research on edible wild plants in this study region has focused on species utilized by hunter-gatherers. Cleland and Johnston (1937-1938a; 1937-1938b) identified local plant names and their dietary uses by peoples inhabiting the Musgrave Range region, specifically the Pitjanjara and Yankunjajara peoples, noting 53 edible species (Table 45). In a later paper Johnston and Cleland (1942) worked among the Andigerri and Wirrung tribes of the Ooldea region of southern Australia, identifying 21 species of edible plants (Table 46). Bourne (1953) presented a basic overview of Australian Aboriginal diet, noting use of Cyperus rotundus, Claytonia spp., Marsilea quadrifolia, Scleroderma spp., Ipomoea spp., Araucaria spp., and Marsdonia leichhardi. Meggitt (1957), studied the Walbiri of central Australia, reporting numerous species (Table 47), while Irvine (1957) reported more than two hundred species of wild, emergency foods of Australi and Tasmanian Aboriginal peoples (Appendix 19).

Specht (1958), participating in the American-Australian Arnhem Land expedition, identified more than eighty wild foods commonly consumed (Table 48) while McArthur (1960) reported 27 species frequently used in Arnhem Land, near Hemple Bay, Bickerton Island, Port Bradshaw, and Fish Creek (Table 49). Fysh et al. (1960), continuing the Arnhem Land report, identified an additional 16 species collected by hunter-gatherer women and provided additional nutritional composition data on these species (Table 50).

Arndt (1961) focused on indigenous sorghum species as used by the Tagoman of northern Australia, noting use of Sorghum intrans and Sorghum plumosum as the most common wild types used in local diet. Worsley (1961), working among the Wanindiljaugwa, identified 120 plants as economically useful (but does not clearly differentiate those that are edible). Gould (1969), studied the Pitjantjatjara of the Musgrave Range and related peoples, noting six genera with outstanding dietary potential: Canthium latifolium, Chenopodium rhadinostachyum, Eragrostis eriopoda, Ficus spp., Santalum acuminatum, and Solanum eremophilum.

One of the major works on Australian hunter-gatherer dietary traditions is that by Cribb and Cribb (1974) who identify several hundred food resources, identified by fruit, seeds, leaves-shoots, roots-tubers, flowers, water sources, gums and exudates, algae, and fungi (Appendix 20). An interesting publication by Wiminyd and Peite (1978) outlines from the Aboriginal viewpoint the inter-relationships between health and nutrition, noting extensive dietary use of Carissa lanceolata, Ipomoea costata, Leichardtia australis, Owenia reticulata, and Santalum lanceolatum (high in vitamin C with good protein values). Parker (1980), working on ethnobotany at Leonora in the western desert of Australia, identified 11 edible species used north of Kalgoorlie (Table 51).

Hiatt (1967) reviewed the food quest, economy, and ultimate extermination of the Tasmanian Aborigines, noting that by 1804-1830, most had been killed. Through an interesting technique of historical reconstruction, comparing 300 reports in the literature, it becomes clear that the Tasmanians consumed at least 13 plant species, among them ferns, mushrooms, bark, kelp, roots, and seeds. It is curious that among the 300 published reports on the Tasmanians, none mention use of fruits!

Incomplete data from New Zealand reveal widespread use of Corynocarpus laevigatus, C. similis, and C. dissimilis, a wild species useful in reconstructing migrations between New Zealand, New Caledonia, and the New Hebrides.

Miscellaneous Asian Reports

In the course of obtaining literary references to Asian edible wild plants, three citations were obtained that did not fit directly into the region of southern, southeast, or insular Asia. Two of these (not seen) document extensive use of wild plants in Soviet Asia (Kokin, 1933; Korovka et al. 1978). A third reveals use of wild plants in Iran (Aynehchi and Samuelsson, 1978), especially *Astragalus ascendens*, collected in the Zagros Mountains of western Iran; a "mana" produced on this plant is 34% fructose. Between 2-300 tons of this product are produced each year and the authors support the contention that commercial operation of "mana" as a sugar substitute could approach 1,000 tons annually.

TABLES 29 - 51 FOLLOW

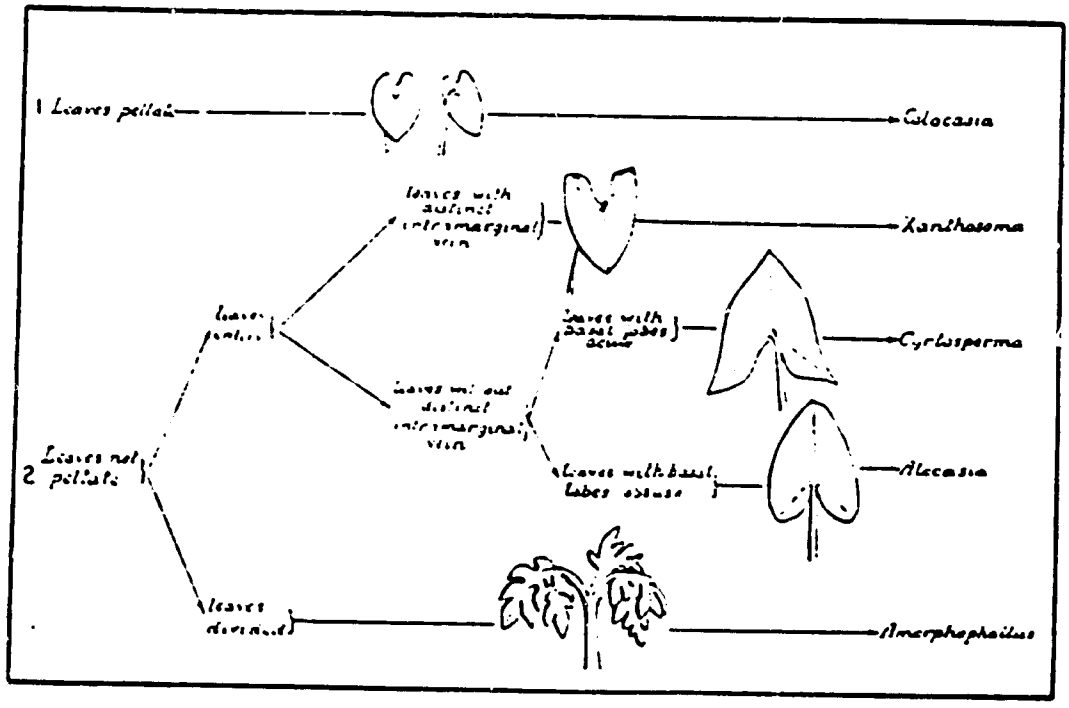
TEXT RESUMES ON PAGE 106

Table 29. Wild Edible Plants Common Throughout the South Pacific (Massal and Barrau, 1956)

ANALYSIS OF SAGO SAMPLES MADE IN THE S.P.C. BIOCHEMISTRY LABORATORY BY MR. F. E. PETERS

Description	Water	Ash	Fibre	Starch (as hydrol.)	Free Reducing Sugars	Ether Extract	Total Nitrogen	N x 6.25
Raw Sago	27.0	0.1	0.3	71.0	Nil	Nil	Trace	—
*Sago Senole**	23.0	0.5	1.0	59.0	0.5	16.5	0.30	2.0
*Sago Ego***	37.5	0.5	1.5	53.0	0.5	Nil	0.1	0.5
	52.5	0.5	0.6	40.0	0.5	Nil	Trace	—
*Sago Lempeng****	22.0	0.3	0.2	64.0	Nil	Nil	Trace	—
*Sago Huia*****	55.0	1.5	1.0	36.0	1.0	1.0	Trace	—
*Sago Bungtoor******	42.0	0.5	0.5	53.0	0.2	2.0	Trace	—

* Common preparation made from a mixture of sago and grated coconut, shaped into a flat cake and baked.
** Sago flour presented in biscuit form wrapped in sago leaves.
*** Sago biscuits.
**** Sago flour cooked in a green bamboo.
***** Washed flesh of sago pulp.



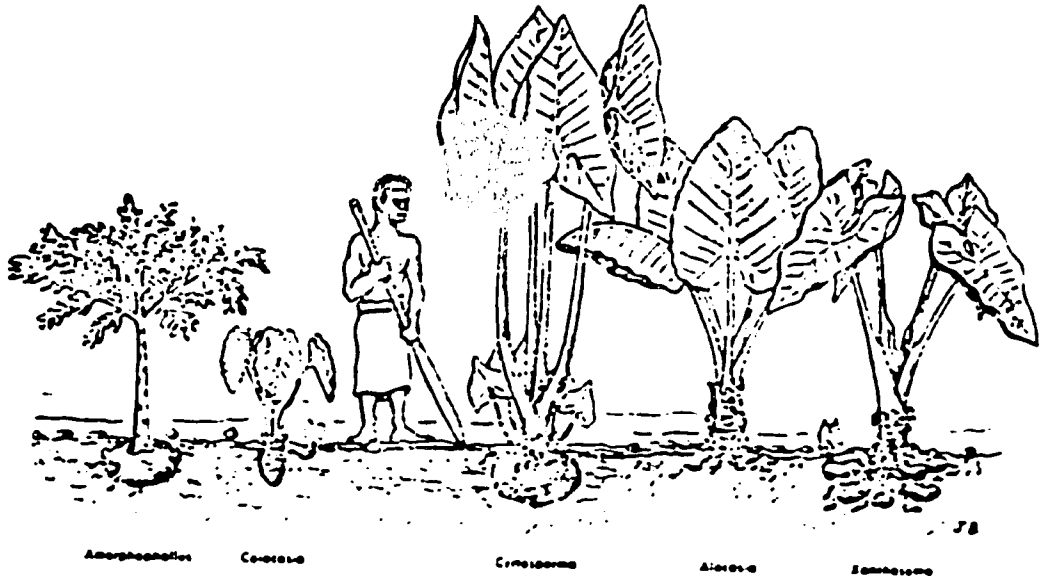


Table 30. Supplementary Food Plants of Polynesia and Micronesia (Barrau, 1961)

Latin Terminology	Portion Consumed
Cycas rumphii	Seeds
Pandanus tectorius	Seeds
Nipa fruticans	Seeds
Nelumbo nucifera	Seeds
Inocarpus edulis	Seeds
Adenanthera pavonina	Seeds
Delonix regia	Seeds
Canarium commune	Nuts
Aleurites moluccana	Nuts
Pachira aquatica	Nuts
Bruguiera sexanduia	Nuts (embryo)
Terminalia catappa	Nuts
Cordia subcordata	Nuts
Caulerpa racemosa laetetirans	Leaf
Caulerpa racemosa microphysa	Leaf
Codium spp.	Leaf
Polyopes	Leaf
Asplenium nidus	Leaf
Freycinetia monticola	Leaf
Pandanus tectorius	Leaf
Miscanthus japonicus	Shoot
Xanthosoma brasiliense	Leaf
Amaranthus viridis	Leaf
Amaranthus spinosus	Leaf
Portulaca lutea	Leaf
Portulaca johnii	Leaf
Nasturtium officinale	Leaf
Sesbania grandiflora	Flower
Tephrosia spp.	Shoot
Solanum anthropophagorum	Fruit
Solanum nigrum	Fruit
Physalis peruviana	Fruit
Marattia fraxinea	Stem
Eleocharis dulcis	Tuber
Metroxylon upolense	Pith
Metroxylon rumphii	Pith
Metroxylon sagu	Pith
Cordyline terminalis	Tuber
Pueraria lobata	Root
Pachyrrhizus erosus	Tuber
Freycinetia rapensis	Fruit
Ximenia americana	Fruit
Coccoloba uvifera	Fruit
Crataeva speciosa	Fruit
Inga feuillei	Pod
Pithecellobium dulce	Pod

TABLE 30 (CONTINUED)

Latin Terminology	Portion Consumed
Averrhoa carambola	Fruit
Cicca acida	Fruit
Spondias dulcis	Fruit
Pometia pinnata	Fruit
Muntingia calabura	Fruit
Grewia populifolia	Fruit
Hibiscus sabdariffa	Flower
Dillenia indica	Fruit
Flacourtia cataphracta	Fruit
Mammea americana	Fruit
Eugenia malaccensis	Fruit
Eugenia jambos	Fruit
Syzygium jambolanum	Fruit
Diospyros discolor	Fruit
Morinda citrifolia	Fruit
Cordyline terminalis	Tuber
Pemphis acidula	Bark; Sap
Cinnamomum spp.	Bark
Cymbopogon citratus	Leaf

Table 31. Edible Wild Species of Papua and New Guinea (Ryan, 1972)

Latin Terminology	Portion Used
Abelmoschus manihot	Leaf
Amaranthus tricolor	Leaf
Amaranthus hybridus	Leaf
Musa spp.	Flower
Evodia hortense	Leaf
Asplenium spp.	Stalk; Buds
Athyrium spp.	Stalk; Buds
Cyclosorus spp.	Stalk; Buds
Diplazium spp.	Stalk; Buds
Pteris spp.	Stalk; Buds
Ficus dammaropsis	Fruit
Momordica charantia	Seed
Trichosanthes cucumerina	Seed
Oenanthe javanica	Leaf
Arenga spp.	Shoot
Pueraria lobata	Tuber
Setaria palmifolia	Shoot
Nasturtium spp.	Leaf
Lansium domesticum	Fruit
Durio zibethinus	Fruit
Averrhoa carambola	Fruit
Averrhoa bilimbi	Fruit
Spondias dulcis	Fruit
Artocarpus heterophyllus	Fruit
Eugenia malaccensis	Fruit
Eugenia aquae	Fruit
Eugenia jambos	Fruit
Eugenia javanica	Fruit
Garcinia mango ana	Fruit
Myristica fragrans	Fruit
Nephelium lappaceum	Fruit
Hibiscus sabdariffa	Fruit
Inocarpus edulis	Nut
Barringtonia edulis	Nut
Artocarpus altilis	Seeds
Aleurites moluccana	Nut
Finshia chloroxantha	Nut
Canarium indicum	Nut
Terminalia catappa	Nut
Terminalia solomonensis	Nut
Pandanus spp.	Nut
Bruguiera spp.	Nut
Terminalia kaernbachii	Nut
Terminalia impediens	Nut
Borassus flabellifer	Nut
Trichosanthes spp.	Seeds
Gnetum gnemon	Nut

Table 32. Edible Wild Plants of the Kukukuku of Southeast-Central New Guinea (Blackwood, 1940)

Botanical name	Native name: Manki	Native name: Nauti	Portion used	Purpose and manner of use
Food and accessories				
Alsophila sp. (probably)		*lano-yong*	Leaves	Eaten cooked
Archidendron sp.	*kombete*	*wunkoge*	Bark	Burnt to make substitute for lime, chewed with areca nut
Asplenium affine Sw.		*nomdoge*	Leaves	Eaten cooked, especially with eels and fish
Asplenium sp. (near amplissimum Willd.)		*mandiro*	Leaves	Burnt to make substitute for salt
Asplenium sp. cf. A. laserpitiifolium Lam.	*kanakere*	*kanaure*	Leaves	Cooked with eels in roll of bark, eaten
Astrumia sp.	*kamale*		Young leaves	Eaten fresh
Bowlaginadendron sp.		*ingainizebu*	Leaves	Eaten
Chloranthus officinalis L.		*erua*	Leaves	Cooked with meat and eaten as a vegetable
Cinnamomum sp.	*kaize-ara*	*tuoua*	Leaves	Chewed fresh as a relish
Cinnamomum sp. (another)	*pokeare*		Leaves	Eaten cooked
Cinnamomum sp. (another)		*kigodeure*	Leaves and bark	Eaten
Coix Lacryma-Jobi var novo-guineense pilger	*mongamiaja*		Stem	Burnt to make substitute for salt
Coleus sp., prob. C. Blumei Benth.		*udende*	Leaves	Cooked and eaten as a vegetable
Cyphomandra sp. (prob.)	*yanim*	*urbug*	Leaves	Eaten fresh
Desmodium microphyllum (Thunb.) DC.	*kanaruri*		Leaves	Eaten fresh
Dioscorea ?asperum Bl.		*kaupirere*	Leaves	Cooked with meat and eaten as a vegetable
Dioscorea cordifolium Bl.		*kanale*	Leaves	Cooked and eaten when hungry in the bush
Dryopteris ?sparsa O. Kuze.	*kanakere*		Leaves	Cooked with meat and eaten as a vegetable
Dryopteris truncata (Poir.) O K.	*opinto*		Leaves	Cooked with meat and eaten as a vegetable
Dryopteris sp. cf. D. arborescens (Willd.) O K.	*kanakere*		Leaves	Cooked with meat and eaten as a vegetable
Elaphoglossum sp. cf. E. macrophyllum Hooker.		*kaupa*	Whole plant	Burnt to make substitute for salt.
Garcinia sp.	*pom or ondakandopata*	*mire*	Leaves and bark	Eaten with "salt."
Gnetum rubicundum Laiell.		*rombogo*	Leaves	Eaten fresh with "salt"
Hemionitis palmata Pietum (L.) Greff.	*kortiga*	*kamaiga*	Young leaves	Cooked in bamboo with other leaves and eaten with "salt"
Hibiscus Manihot L. var. palmatus (Cav.) DC.	*nirata (kiaiga)*		Leaves	Cooked with meat and eaten as a vegetable; particularly good with human flesh
Ipomoea hederifolia Warburg		*angebot*	Whole plant	Burnt to make substitute for salt
Ipomoea Mooreana Schlechter		*uramkade*	Whole plant	Burnt to make substitute for salt
Ipomoea nivea Schlechter		*mamaga*	Whole plant	Burnt to make substitute for salt
Ipomoea sp. (another)		*wanara*	Whole plant	Burnt to make substitute for salt
Ipomoea sp. (another)	*wame pa-ga*	*kuiogo*	Leaves	Eaten with "salt"
Ipomoea sp. ?		*kuiogo-[illegible]*	Leaves	Eaten fresh with "salt"
Lactuca sativa L.	*kanigoa*	*kakoni*	Seeds	Chewed as substitute for areca nut, but without lime and betel pepper
Food and accessories—(Continued)				
Lauraceae		*ibua*	Leaf buds of saplings	Eaten fresh with "salt"
Libocedrus papuana F. Muell.	*iruwaturra*	*pe-ania*	Leaves	Eaten fresh with "salt"
Lycopodium cernuum L.		*pupu-pupu*	Leaves	Eaten fresh with "salt"
Meliaceae indet.	*aturbata*	*takuvinda*	Bark	Burnt to make substitute for lime
Nicotiana Tabacum L.	*takoperua*	*kelu*	Leaves	Dried over fire and smoked in bamboo tube
Oenanthe stolonifera Wall. sens. lat.	*kanaula*	*kanuga*	Leaves	Cooked with meat in bamboo or in earth oven, eaten as a vegetable
Piles sp.		*pubiya*	Leaves and flowers	Eaten fresh with "salt"
Piles sp. (another)		*kaukuga*	Leaves and flowers	Eaten fresh with "salt"
Piper sp. cf. P. arborescens Trelease	*angganda*		Young leaves	Chewed with areca nut and substitute for lime
Pipturus argenteus (Forst.) Weddl.	*yandire*	*kiuia*	Bark and leaves	Eaten with "salt"
Polypodium commutatum Bl.		*yuuua*	Leaves	Cooked with meat and eaten as a vegetable
Polypodium irioides Poir.	*nauuure*	*keiua*	Leaves	Eaten with "salt"
Polypodium linguaeforme Mett.		*keiua*	Leaves	Eaten with "salt"
Pteris ? moluccana Bl.	*akamatere or mandiro-ferra*	*kaiiua*	Young leaves	Cooked and eaten with meat; particularly good with cassowary
Rhodomyrtus novoguineensis Diels	*epata*	*kamaipa*	Leaves and fruit	Eaten with "salt"
Rungia sp. ?	*nowipata*		Leaves	Cooked with meat and eaten as a vegetable
Saurauia sp.		*uopanda*	Leaves	Burnt to make substitute for "salt." Other leaves wrapped in it for burning
Saurauia sp. ?		*uokiuua*	Fruit	Eaten fresh
Setaria sp.	*kamiura*		Grass	Eaten with "salt"
Zingiberaceae indet.	*kotanda*	*iuiui*	Whole plant	Burnt to make substitute for salt
Connected with food supply but not eaten				
Acanthorhizophum papuanum Schlechter	*kuorpa*		Leaves	Wrapping for food while cooking in earth "oven"
Clematis sp.	*kuikaire*	*uakiiake*	Stem	Pulped and thrown into water to stun fish
Derris sp.	*pokeare*	*uuua*	Root and lower part of stem	Crushed with stone, thrown into water to stun fish
Ficus septica Burm. F.	*utkaurpa*		Bark	Used as container for food cooked over open fire
Scathoglottis rivularis Schlechter	*uuoo-kiuu-pata*		Leaves and bulb	Fed to pigs

Table 33. Edible Wild Staples of the South Pacific (Hipsley and Kirk, 1965)

Common Name (Location, Fijian (FI) or Native Name (NN))	Botanical Name	Place in Diet	Description	Cooking Method
7. Greens (Fiji)				
a. Kaiyo (FI)	[illegible]	Supplement to staple (infrequent)	Cultivated. Grows small and lushly. Leaves [illegible] green, with some pink [illegible] red margins.	(1) Covered in native oven. (2) Boiled in fresh water. Water discarded.
b. Kurgo (FI)	[illegible]	Supplement to staple (infrequent) due to influence of [illegible] season.	[illegible] tree. Young terminal leaves only used. These were about 2 inches long and here grown. Grow wild. Had a flavour reminiscent of spinach.	(1) Covered in native oven, usually mixed with other greens. (2) Boiled with pig's head at feasts and [illegible] cooking. A smaller hole was made in ground, lined with banana leaves, hot stones put into the hole, and kurgo laid on top. Covered this way, the leaves were still crisp when eaten.
c. Wild Parsley Root (FI)		Supplement to staple (infrequent, other than on festive occasions)	Pale green, in appearance like celery or carrot tops. Tended to grow uncultivated in old gardens.	(1) Covered in native oven mixed with variety of greens. (2) Mixed with pig's head at feasts and mixed wrapped in banana leaves, suspended over a slow fire.
d. Tanno (NN)		Supplement (infrequent)	Cultivated. Pale green leaf, approximately the size and shape of a bay leaf.	Cooked with mixture of greens in native oven.
e. Kawara (NN)		Supplement to staple (infrequent)	Pale green small leaf, with small yellow flower. Both are eaten.	Cooked in native oven, in a mixture of greens.
f. Breadfruit Leaves Kaiyo (FI)	[illegible]	Supplement (rarely at feasts)	Large tree. Fruit is edible. Young leaves only are eaten.	Usually cooked with pig fat in a native oven.
g. Lemon Grass		Supplement (infrequent)	Leaves grow in a clump directly from ground. Pale green, long thin leaf, [illegible] of distinctive lemon odour.	(1) Cut into pieces about [illegible] inch long. Cooked with mixed greens in native oven. (2) At pig killing, charred fire, rolled with small pieces of pig meat and fat in leaf, stuffed into pig's intestines, baked in native oven.
h. Tabongo	[illegible]	Supplement (occasional)	Cultivated. Introduced by Europeans. [illegible] former, now used as tuber, as native greens.	(1) Chopped roughly and cooked with greens in native oven. (2) Whole young leaves cooked separately in oven.
i. Lipefuyuia (FI)	[illegible]	Supplement (infrequent)	Cultivated. Young leaves and tips of stem used.	(1) Cooked with greens in native oven. (2) Boiled in fresh water with pulled leaves. Water discarded.
j. Lipefuro (FI)	[illegible]	Supplement	Cultivated. This is used for pig food only. Indicates stems as well as leaves.	Boiled in fresh water.
k. Tree Fern Tuvaka (Fi)		Supplement (if [illegible])	[illegible] young leaf curls inwards for eating with pig.	(1) Covered in native oven with pig fat. (2) Boiled with pig's blood, put into banana leaf, tied into [illegible] shaped bundles, and suspended over fire to cook.
l. Kawa (NN)		Supplement (rarely)	Leaf [illegible] shiny surface.	Used only at pig feasts. Not seen around.
m. Nibiso (FI)	[illegible]	Supplement (infrequent)	Cultivated. Grows [illegible] on [illegible] ground. [illegible]	Cooked in native oven with mixture of greens.

Cont. next page

Table 34. Edible Wild Plants, New Guinea, Ndwimba Basin (Clarke, 1971)

Latin Terminology	Portion Used
Alocasia macrorrhiza	Stem
Artocarpus fretissii	Seed
Castanopsis acuminatissima	Nut
Coix lacryma-jobi	Seed
Coleus scutellarioides	Leaf
Cyathea angiensis	Leaf
Cyclosorus truncatus	Shoot
Dianella spp.	Leaf
Dioscorea spp.	Tuber
Diospyros spp.	Leaf
Diplazium spp.	Shoot
Ficus bytryocarpa subalbidoramea	Fruit
Ficus itoana	Fruit
Ficus dammaropsis	Leaf; Fruit
Ficus iodotricha	Leaf; Fruit
Ficus nodosa	Leaf; Fruit not eaten
Ficus pungens	Leaf; Fruit
Ficus wassa	Leaf; Fruit
Gronophyllum chaunostachys	Pith
Mangifera spp.	Fruit
Melanolepis spp.	Leaf
Musa spp.	Fruit
Pandanus foveolatus	Nut
Pandanus julianettii	Nut
Phrynium spp.	Leaf
Polypodium spp.	Stem
Pouzolzia hirta	Leaf; Stem
Rubus moluccanus	Fruit
Setaria palmifolia	Pith
Solanum nigrum	Leaf
Spondias dulcis	Fruit
Sterculia spp.	Pods
Trichosanthes spp.	Fruit
Ficus copiosa	Fruit

Table 35. Edible Wild Plants of the Chimbu, Papua New Guinea (Sterly, 1974/75)

Latin Terminology	Local Terminology
Amomum spp.	Bonggugl
Amymema spp.	Denigl Pongi
Apium graveolens	Supsup
Alpinia spp.	Anggre Kene
Amaracarpus spp.	Dua Kenande
Amaranthus tricolor	Kungi gurugl
Canna indica	Bonggugl
Belvisia callifolia	Siune Yagle
Blumea arnakidophora	Ende Dondun
Bryonopsis laciniosa	Kan kamuna
Cucumis spp.	Sugla
Cyathea aeneifolia	Bomba
Cymbopogon citratus	Waimugl
Colocasia esculenta	Me
Coix lachryma-jobi	Werai Bitn
Decaspermum spp.	Szuma
Gleichenia bullata	Oma
Gnaphalium purpureum	Kuglame Tugl
Erechtites valerianifolia	Gegl Gagl
Ficus copiosa	Kogla
Ficus dammaropsis	Kogun
Lithocarpus spp.	Denigl pongi
mpatiens spp.	Nouglai Bigi
Imperata cylindrica	Indaun
Oenanthe javanica	Dini
Ophioglossum pendulum	Yaugl Sirugl
Oxalis corniculata	Pugluo Pagai
Maranta spp.	Siwil Taugl
Musa spp.	Kambe
Phymatodes scolopendria	Dem Pugaika
Physalis peruviana	Tomato
Phragmites karka	Enggre
Pilea spp.	Korara
Palmeria spp.	Danggema
Pandanus brosimos	Amugl Keja
Pandanus conoideus	Komba
Pandanus julianetti	Amugl Inguglsi
Passiflora edulis	Prut; Mondong
Passiflora mollissima	Mondun Olto
Rubus rosaefolius	Korkorumba
Rungia kloossii	Aglemba
Saccharum officinarum	Bo
Psophocarpus tetragonolobus	Ondugl
Psychotria spp.	Koglo muglo
Pueraria spp.	Gondoma
Trichosanthes spp.	Mume

TABLE 35 (CONTINUED)

Latin Terminology	Local Terminology
Tritonia crocosmiflora	Mangam gogl
Xanthosoma spp.	Me mangge
Setaria palmifolia	Kumba kuragl
Sloanea spp.	Av gle
Sonchus spp.	To a mam
Thelypteris spp.	Tambuno

Table 36. Edible Wild Plants of New Guinea (Oomen and Malcolm, 1958)

The values are expressed in grams (or milligrams) per 100 grams of edible portion

Name	Calories	Protein g	Carbohydrate g	Fat g	Water g	Fibre g	Calcium mg	Iron mg	Carotene mg	Thiamin mg	Ascorbic acid mg
1. Seeds (kernels, nuts, grains)											
Beans, dry (Phaseolus vulgaris)	310	25.0	55	1.0	10	4.5	100	8.0	0.015	0.45	-
• green	45	3.0	12	0.1	92	1.0	40	0.8	0.200	0.08	15
Green gram	335	24.0	57	1.0	10	4.0	110	5.4	-	0.47	-
Pigeon pea (Cajanus cajan)	340	22.0	60	1.5	12	6.0	80	5.5	-	0.60	-
Peanut (Arachis hypogaea)	570	26.0	20	1.5	13	5.0	50	4.5	0.065	0.65	2
Soy bean (Glycine max)	550	45.0	23	45.0	5	5.0	45	1.5	-	1.10	-
Breadfruit seeds (Artocarpus incisa/altilis)	415	18.0	26	17.5	12	4.5	260	10.0	0.0	0.50	-
Polynesian chestnut (Inocarpus fagifer)	150	6.0	30	0.5	52	4.0	50	-	-	-	-
Coconut, mature meat (Cocos nucifera)	240	3.5	40	0.5	45	0.5	-	-	-	-	-
• green, firm meat	500	4.0	0	55.0	50	3.0	25	-	[illegible]	0.15	2
• • soft meat	50	1.5	4	5.5	81	0.5	-	-	[illegible]	-	-
• water, mature	50	1.0	4	1.0	92	0.5	-	-	[illegible]	-	-
Maize, green (Zea mays)	13	0.5	2	0.5	95	-	50	-		-	-
• dry	150	4.5	30	1.0	63	1.0	10	0.5	0.010	0.15	10
Job's tears (Coix lacryma-jobi)	360	9.5	70	5.0	12	1.5	6	2.5	0.015	0.50	-
2. Carbohydrate staple foods	140	15.0	60	7.0	12	3.0	70	-	-	0.50	-
Banana (Musa paradisiaca)	105	1.5	25	0.1	72	0.5	9	0.4	0.050	0.05	10
Breadfruit (Artocarpus altilis)	55	0.8	12	0.5	85	1.0	30	0.8	0.004	0.1	25
Cassava (Manihot dulcis)	150	0.8	35	0.5	57	0.5	70	0.5	-	0.04	35
Sweet potato, white (Ipomoea batatas)	90	0.6	22	0.1	76	0.5	20	0.6	0.015	0.08	60
• yellow	140	2.1	34	0.1	61	0.9	20	0.6	1.000	0.15	70
Taro (Colocasia spp.)	115	2.0	25	0.2	66	0.7	15	1.0	[illegible]	0.10	9
• (Cyrtosperma spp.)	140	0.8	35	0.5	65	1.5	-	-	-	-	-
• (Nymphaea spp.)	155	2.0	30	0.5	61	0.5	5	0.7	0.005	0.15	10
Yam (Dioscorea alata)	35	1.2	25	0.1	75	0.5	15	0.5	-	0.10	15
Arrowroot (Tacca pinnatifida)	75	2.5	16	0.3	72	4.0	-	-	-	-	-
Fern roots (Pteris aquilina)	272	1.0	67	0	13	10	-	-	-	-	-
Sago, raw (Metroxylon sagu)	285	0.2	71	-	27	0.3	3.0	0.7	-	-	-

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Name	Calories	Protein g	Carbohydrate g	Fat g	Water g	Fibre g	Calcium mg	Iron mg	Carotene mg	Thiamin mg	Ascorbic acid mg
3. Leafy vegetables											
Amaranthus (Amaranthus spp.)	45	3.0	7	0.5	86	1.5	400	30.0	5.850	0.01	70
Bracken tips (Pteridium spp.)	35	2.5	6	0.2	90	0.5	30	0.4	0.015	0.15	4
Cabbage (Brassica spp.)	35	1.9	7	0.1	88	1.0	30	0.2	0.050	0.06	50
Cassava leaves (Manihot dulcis)	75	6.2	10	1.0	79	2.5	175	0.4	0.090	0.12	300
Cocoa (Theobroma cacao) leaves	90	5.9	12	0.2	66	12.0	510	2.7	10.475	0.11	200
Fern (Athyrium esculentum)	20	0.4	2	0.1	92	1.0	20	0.0	0.000	0	15
Kangkong (Ipomoea aquatica)	30	4.0	3	0.5	90	1.0	50	4.5	2.475	0.12	60
Papaya leaves (Carica papaya)	60	5.0	15	2.0	75	0.0	330	0.8	1.950	0.16	200
Pumpkin tips (Cucurbita pepo)	35	3.0	4	0.4	87	1.0	100	1.0	[illegible]	0.16	50
Sweet potato shoots (Ipomoea batatas)	40	3.5	6	0.5	85	1.5	70	0.0	[illegible]	0.12	25
Taro leaves (Colocasia spp.)	50	2.5	5	2.0	85	1.5	400	-	7.500	0.20	160
Watercress (Nasturtium officinale)	15	2.4	1	0.2	95	0.5	80	-	0.700	0.08	35
4. Fresh fruits											
Tomato (Lycopersicum)	15	0.7	2	0.2	95	0.5	15	0.2	-	0.05	15
Papaya (Carica papaya)	25	1.5	5	0.1	92	1.0	10	0.4	-	0.05	5
Watermelon (Citrullus vulgaris)	20	0.5	5	0.1	94	0.1	4	0.4	0.010	0.02	7
Guava (Psidium guajava)	65	1.5	12	1.0	76	4.0	10	1.4	0.050	0.07	100
Water apple (Eugenia malaccensis)	25	0.8	5	0.1	91	0.4	5	1.4	0.040	0.05	15
Rose apple (Eugenia jambos)	30	0.5	6	0.2	85	0.0	45	0.5	0.100	0.02	15
Mango, ripe (Mangifera indica)	70	1.5	16	0.2	81	0.5	15	0.4	0.175	0.05	75
Papaya, green (Carica papaya)	25	0.5	6	0.1	91	0.5	20	0.3	0.045	0.05	30
• ripe	40	0.5	9	0.1	90	0.5	20	0.4	0.200	0.03	70
Passion fruit pulp (Passiflora spp.)	70	1.5	15	2.0	71	0.5	9	-	-	0.05	25
Raspberry (Rubus spp.)	55	1.0	12	0.4	85	1.0	25	1.5	0.010	0.03	15
Eggplant (Solanum melongena)	25	1.5	4	0.3	92	1.0	10	0.6	0.010	0.05	4
5. Shellfish											
Lobster, langouste	80	16	-	2	80	0.5	90	0.5	-	0.15	-
Crab	80	16	0.5	1.5	80	1.0	40	0.8	-	0.10	-
Prawns	80	19	0.1	0.8	85	-	50	1.6	0.015	0.05	-
Oysters	84	10	5.5	2.0	80	2.0	55	5.5	0.140	0.15	-
Clams	80	12.5	3.5	1.5	80	-	65	7.5	0.065	0.17	-
Sea cucumber	55	12	1.4	-	76	-	1.0	1.5	-	-	-
Small fresh water fish	95	19	-	3	75	-	700	-	-	0.15	-
Large sea fish	100	16	-	5	80	-	-	1.5	0.055	0.11	-

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Table 37. Nutritional Composition of Sago Ash, A Salt Substitute of Papua New Guinea (Townsend et al., 1972)

TABLE I

Edible portion of foodstuffs consumed and *per capita* daily intake of protein and calories, Yareno Hamlet, May 16–25 and July 3–13, 1967

	Edible portion g/person day				Per capita daily intake		
	May	July	Mean for both periods	Ref.	Calories	(kJ)	Protein (g)
Vegetable foods							
Sago	697	642	667	1	1901	(454)	1.3
Bananas	38	47	43	1	45	(10)	0.5
Taro	4	9	6	1	6	(1.4)	0.1
Other tubers	0	9	5	1*	5	(1.1)	0.1
Breadfruit seeds	36	< 1	18	1	27	(6.4)	1.1
Coconut	1	< 1	1	1	5	(1.1)	0.0
Pandanus	0	11	6	2	10	(2.2)	0.2
Canarium almond	< 1	0	< 1	3*	1	(0.2)	0.0
Pumpkin	8	16	12	1	3	(0.7)	0.2
Papaya	9	32	20	1	8	(1.9)	0.1
Other fruit	11	1	6	1*	2	(0.4)	0.0
Greens	40	16	27	1*	5	(1.1)	0.7
Napi cabbage	25	3	13	3	4	(1.0)	0.3
Lupi	3	1	2	3	< 1	—	0
Total	874	787	826		2022	(443.3)	4.7
Animal Foods							
Pork	53	46	51	3	191	(45)	7.2
Fish	17	14	14	3	13	(3.1)	2.6
Grubs	7	4	5	4	9	(2.1)	0.2
Game	2	0	2	3*	2	(0.4)	0.2
Snails	< 1	0	< 1	3	< 1	—	0
Insects	0	< 1	1	3†	1	(0.2)	0.1
Total	54	64	73		216	(51)	10.6
Total animal and vegetable foods	955	851	899		2238	(535.2)	15.2

* Treated as equivalent to yams for food value computation.
* Treated as bananas.
* Treated as Malay people.
* Food value based on the form *Albizzia xylocarpa*.
* Food value based on eulion.
† Food value based on locusts.

Sources for Food Values

1. Paltsis in Oomen and Malcolm, 1958, 140–141.
2. Calculated by Hinsley and Kirk (1965: 39).
3. Watt, 1962.
4. Hinsley and Clements, 1947.

TABLE II

Mineral nutrients of sago ash used by Sanio-Hiowe people at Upper Sepik area in New Guinea

Sample	Sodium (%)	Potassium (%)	Calcium (%)	Magnesium (%)	Iron (%)	Phosphates (%)	Phosphorus (%)
Sago ash (SA)	0.59	26.3	11.7	3.48	0.04	2.1	0.69
Ash of Sago ash (ASA)	0.92	30.5	15.7	4.34	—	—	—

TABLE III

Alkalinity of sago salt used by Sanio-Hiowe people at Upper Sepik in New Guinea

	Sago ash (SA)	Ash of sago salt (ASA)
	Alkalinity (meq)	
Original sample	834	1122
Water soluble	221	353
Water insoluble	548	593

‡ Sizonx SC manufactured by Monsanto Chemical Company, St. Louis, Missouri.

§ Coleman Instruments Coleman Model 21 Flame Photometer, 21-600, Operating Directions, Maywood, Illinois.

Table 38. Edible Wild Plants of the New Guinea Highlands (Bailey, 1967)

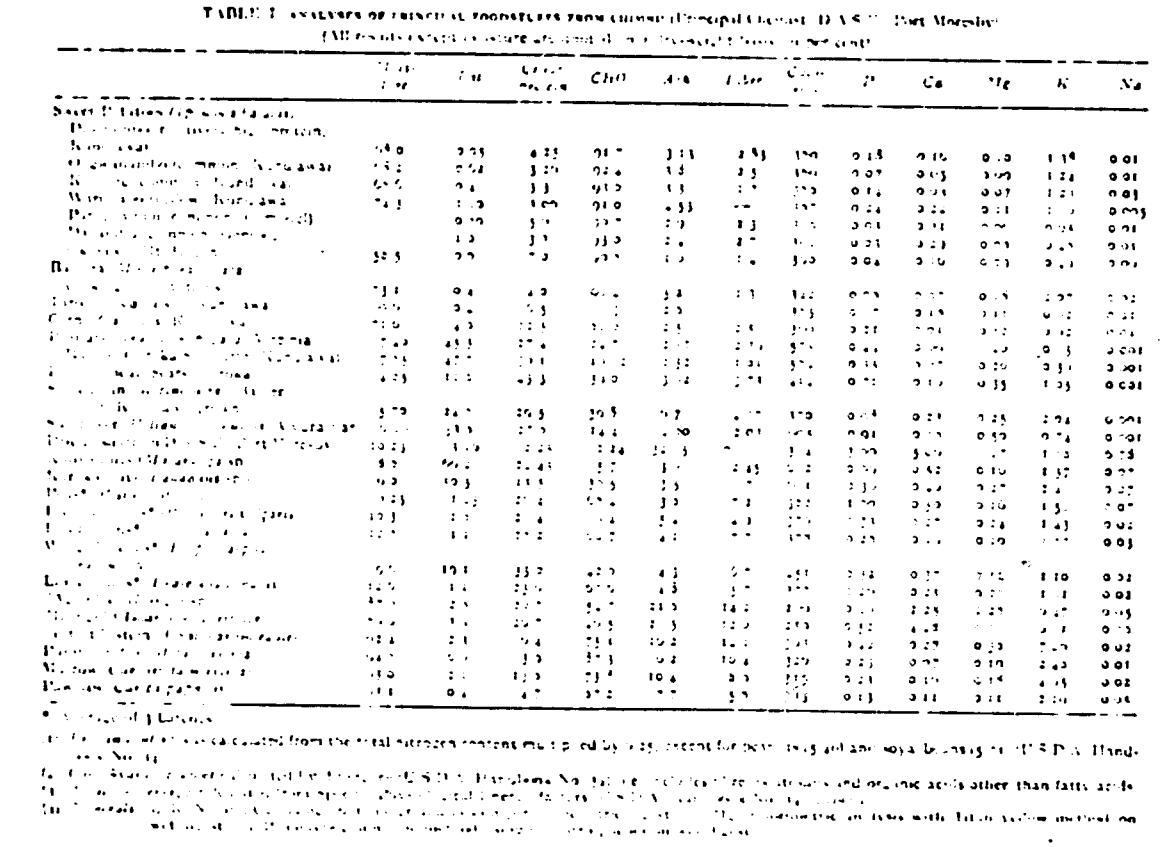

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Table 39. Edible Wild Plants, British Solomon Islands (Tedder, 1973)

Latin Terminology	Portion Used
Colocasia esculenta	Tuber
Cyrtosperma chamissonis	Tuber
Alocasia macrorrhiza	Tuber
Xanthosoma spp.	Tuber
Amorphophallus	Tuber
Dioscorea nummularia	Tuber
Dioscorea pentaphylla	Tuber
Dioscorea bulbifera	Tuber
Hibiscus manihot	Leaf
Pisonia grandis	Leaf
Gnetum gnemon	Nut; Leaf
Ficus wassa	Leaf
Ficus copiosa	Leaf
Polyscias spp.	Leaf
Pseuderanthemum spp.	Leaf
Cyathea brackenridgei	Shoot
Athyrium esculentum	Shoot
Diplazium esculentum	Shoot
Canarium indicum	Nut
Canarium salomonense	Nut
Barringtonia edulis	Nut
Terminalia catappa	Nut
Terminalia kaernbachii	Nut
Inocarpus edulis	Nut
Terminalia megalocarpa	Fruit
Spondias dulcis	Fruit
Eugenia malaccensis	Fruit
Pometia pinnata	Fruit

Table 40. Edible Wild Plants, Santa Cruz, Solomon Islands (Yen, 1974)

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Table 41. Edible Wild Plants, Loyaute, New Caledonia (Dubois, 1971)

X — Plantes sauvages mangées.

Ce n'est que par hasard que j'ai pu prendre connaissance de ces plantes :

Lane = *Asplenium nidus avis;* ses feuilles encore replicées, mangées cuites.

beshe, beshi = *Ficus storckii* : sont mangés ses fruits *(wa-beshi)* et ses feuilles cuites.

cele = *Tetragonia tetragonioides*, herbe mangée cuite

cengion = Pleurote comestible, mange cuit.

c ngod = *Tet gonia*, feuilles cuites

(ko-re-) nthungo = *Eustrephus latifolius*, bourgeon cuit.

dango = *Dragocera crispetala;* fruits rôtis cuits en *nel*, aliment de famine.

drui, drure = *Saccharum spontaneum*, tige mangée éclatée au feu.

epod = *Rapanea* sp., fruit mûr cru.

i on = *Morinda citrifolia*, ses feuilles froissées parfument l'eau; prises maintenant en tisane

ja = *Garcinia poidedula;* fruit rouge *wala* cru quand il est mûr; serait bon en confiture.

kou ni un = *Passiflora mesantha*, fruits mûrs crus

kuni = *Solanum erianthum*, fruit mangé cru avec précaution.

mitrun = *Grammatophyllum pictum*, feuilles mangées cuites.

pepi = *Grewia crenata*, feuilles cuites

pietru = *Auricularia Judae*, champignon très apprécié, mangé cuit.

pi u, piau, cf. *beshe*

pi ri tolo, i = morille (*), champignon très apprécié, mais très rare

tou = *Piper mastocladianum;* permet de boire en forêt.

tro = fruits mûrs crus

u en = *Musanga* [illegible], partie tendre de la lame mangée cuite; son fruit [illegible] est gardé dans un coin de la bouche comme friandise

u ko = *Gleichenia dicarpa;* on crache l'enveloppe et on mange le fond

u ngunie fruit mangé cru; permet de se rafraîchir dans le *Hachinerce*

u tiberie = *Cucurbita pepo* (*), comme *u ngunie*.

u ngi ng = *Dioscorea pentaphylla;* tubercule à chair fibreuse, aliment de famine.

wanea pali = *Cheirodia*, manze cuit.

wandenie = fruits crus

xerue = *Pueraria thunbergiana;* racines fibreuses cuites, aliment de famine.

ye-cenerg = plante marine spongieuse mangée en *nel*.

ye-nunio = algue mangée crue.

Les traditions parlent souvent de racines mangées, en particulier pour ce qui concerne la nourriture des *serci Boia* de Jos, gens tout à fait sauvages et anthropes. Je ne crois pas qu'ils s'agissent de magnana. Pour Jos, il s'agit de racines de forêt.

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Table 42. Nutritional Composition of Pandanus spp., Micronesia (Miller et al., 1956)

TABLE 1
COMPOSITION OF PANDANUS FRUIT
(100 grams, Edible portion)

SAMPLE	WATER	FOOD ENERGY CALORIES*	PROTEIN	FAT	CARBOHYDRATES TOTAL	CARBOHYDRATES FIBER	ASH	CALCIUM	PHOSPHORUS	IRON
	gm.		gm.	gm.	gm.	gm.	gm.	mg.	mg.	mg.
1 Lukkerer, fresh	[illegible]	71	0.37	0.27	18.61	0.25	0.55	9.6	25.9	0.69
2 Lukkerer, boiled	[illegible]	58	0.22	0.20	15.42	0.08	0.42	13.3	19.6	0.39
3 Jokeb, fresh	84.17	56	0.35	0.27	14.53	0.30	0.65	16.4	33.0	0.56
5 Pandanus paste	17.63	293	2.23	1.38	76.11	3.29	2.42	134.4	106.2	5.74
6 Pandanus flour	10.60	196	2.94	1.25	60.71	14.95	4.30	797.0	114.0	1.73

* Calories, with the exception of those in pandanus flour, were calculated by phosphorical energy factors recommended for fruit by the U.S.D.A. (Leong, Prior and Wise, 1952; [illegible]). For pandanus flour, factors of 1.5, 9.17 and 4.24 respectively, were used for protein, fat, and total carbohydrate, respectively. These factors, based on the heat of combustion values for fruit and the assimilation coefficients for other foods, were tentatively recommended for use in computing the calories in pandanus fruit by the Human Nutrition Research Branch, Agricultural Research Service (personal communication).

TABLE 2
VITAMIN CONTENT AND pH OF PANDANUS FRUIT
(100 grams, edible portion)

SAMPLE	CAROTENE*	THIAMINE	RIBOFLAVIN	NIACIN	ASCORBIC ACID	pH
	mcg.	mg.	mg.	mg.	mg.	
1 Lukkerer, fresh	[illegible]	0.031	0.016	[illegible]	2.3	5.2
2 Lukkerer, boiled	[illegible]	0.025	0.015	[illegible]	[illegible]	5.1
3 Jokeb, fresh	[illegible]	0.012	0.025	[illegible]	2.6	4.9
4 Jokeb, boiled	[illegible]	0.019	0.012	[illegible]		
5 Pandanus paste	[illegible]	0.037	0.062	[illegible]	(1.5)	5.6
6 Pandanus flour	[illegible] I.U.†	0.062	0.136	[illegible]		5.5

* [illegible] determination method.
† Biological activity of vitamin A based on [illegible].

TABLE 3
NUTRITIVE VALUE OF THE EDIBLE PORTION OF PANDANUS KEYS

NUTRIENTS	1 KEY 75 GMS.	20 KEYS 1500 GMS.
Calories	53	1000
Protein gm.	.28	5.6
Fat gm.	.20	4.0
Calcium mg.	7.2	144
Phosphorus mg.	19.5	388
Iron mg.	.7	14
Carotene mcg.	932	18,000
Thiamine mg.	.02	.4
Riboflavin mg.	.03	.6
Niacin mg.	.7	14
Ascorbic acid mg.	2	40

Table 43. Edible Wild Plants, Island of Guam (Safford, 1905)

Latin Terminology
Caladium colocasia
Dioscorea spp.
Alocasia indica
Alocasia macrorrhiza
Tacca pinnatifida
Maranta arundinacea
Artocarpus communis
Cycas circinalis
Annona squammosa
Annona muricata
Annona reticulata
Averrhoa carambola
Anacardium occidentale
Tamarindus indica

Table 44. Edible Wild Plants, Islands of Kusaie and Lelu, Micronesia (Wilson, 1969)

Latin Terminology	Portion Used
Artocarpus spp.	Fruit
Myristica hypargyraea	Fruit
Cordyline terminalis	Root
Cinnamonum carolinensis	Bark
Terminalia catappa	Fruit
Cocos nucifera	Nut
Pandanus spp.	Nut
Carica papaya	Fruit
Musa paradisiaca	Fruit
Morinda citrifolia	Fruit
Syzygium spp.	Fruit
Psidium guajava	Fruit
Mangifera indica	Fruit
Pangium edula	Fruit
Saccharum officinarum	Stalk
Ananas comosus	Fruit
Ficus carolinensis	Fruit
Tacca leontopetaloides	Tuber

Table 45. Edible Wild Plants from the Musgrave Range, Australia (Cleland and Johnston, 1937/38)

Latin Terminology	Portion Used
Pittosporum phillyreoides	Seed
Billardiera cymosa	Fruit
Sollya heterophylla	Fruit
Acacia salicina	Seed; Bark
Acacia dictyophleba	Seed; Bark
Acacia meissneri	Seed; Bark
Acacia subcoerulea	Seed; Bark
Acacia leiophylla	Gum; Seed; Bark
Brachychiton gregorii	Seeds; Root; Sap
Eucalyptus coesia	Root
Daemia kempeana	Flower; Bud
Hakea leucoptera	Root
Eucalyptus oleosa	Root
Eucalyptus microtheca	Root
Eucalyptus incrassata	Root
Eucalyptus populifolia	Root
Eucalyptus paniculata	Root
Myoporum platycarpum	Gum
Marsilia quadrifolia	Seed
Cyperus rotundus	Root
Ficus platypoda	Fruit
Fusanus acuminatus	Fruit; Nut
Santalum lanceolatum	Fruit
Loranthus spp.	Fruit
Claytonia balonnensis	Leaf
Lepidium ruderale	Leaf; Root
Acacia aneura	Root; Seed
Brachysema chambersii aumba	Flower
Didiscus glaucifolius	Root
Marsdenia leichhardtii	Fruit; Stalk; Leaf
Solanum spp.	Leaf; Fruit
Eremophila spp.	Flower
Melothria spp.	Fruit
Scleroderma spp.	Truffle
Eragrostis eriopoda	Seed
Ficus platypoda	Fruit
Atriplex nummularium	Ash
Boerhavia diffusa	Root
Portulaca oleracea	Stem; Leaf; Seed
Calandrinia volubilis	Whole Plant
Lepidium oxytrichum	Leaf
Stenopetalum velutinum unmuta	Leaf
Acacia aneura	Seed
Solanum ellipticum	Berry
Eragrostis eriopoda	Seed
Thysanotus patersonii	Root
Santalum acuminatum	Fruit

Table 46. Edible Wild Plants from the Ooldea Region, South Australia (Johnston and Cleland, 1942)

Latin Terminology	Portion Used
Stipa spp.	Seed
Eragrostis clelandii	Seed
Thysanotus exiliflorus	Tuber
Casuarina lepidophloia	Root
Hakea multilineata	Root
Hakea leucoptera	Root
Eucarya acuminata	Fruit
Calandrinia polyandra	Leaf
Acacia oxwaldii	Gum
Acacia brachystachya	Leaf
Acacia aneura	Fruit
Acacia spp.	Seeds
Erodium cygnorum	Root
Leptospermum coriaceum	Flowers
Melaleuca pubescens	Leaf
Eucalyptus incrassata	Root
Eucalyptus dumosa	Root
Eucalyptus oleosa	Root
Marsdenia australis	Flower; Bud; Stem; Leaf
Solanum ellipticum	Fruit
Eremophila spp.	Flower

Table 47. Edible Wild Plants of the Walbiri of Central Australia (Meggit, 1957)

Latin Terminology	Portion Used
Acacia aneura	Seed
Acacia notabilis	Seed
Acacia coriacea	Seed
Acacia estrophiolata	Seed
Acacia kempeana	Seed
Acacia tetragonophylla	Seed
Hakea spp.	Seed
Grevillea striata	Seed
Brachychiton spp.	Seed
Ipomea muelleri	Seed
Portulaca spp.	Seed
Aristida spp.	Seed
Canthium latifolium	Fruit
Capparis mitchelli	Fruit
Carissa lanceolata	Fruit
Ficus platypoda	Fruit
Santalum lanceolatum	Fruit
Casuarina decausneana	Fruit
Lorantyus spp.	Fruit
Marsdenia australis	Fruit
Solanum ellipticum	Fruit
Marsdenia australis	Leaf
Hakea lorea	Flower
Hakea intermedia	Flower
Eucalyptus camaldulensis	Flower
Bauhinia hookeri	Flower
Eremophila spp.	Flower
Grevillea spp.	Flower
Dioscorea spp.	Tuber
Vigna lanceolata	Root
Cyperus spp.	Root
Borehavia diffusa	Root
Erythrina vespertilio	Root
Didiscus spp.	Root
Acacia notabilis	Gum
Podaxon spp.	Stem; Cap
Scleroderma spp.	Stem; Cap

Table 48. Edible Wild Plants, Arnhem Land, Australia (Specht, 1958)

	Habitat	Wet Season		Dry Season	
		Oct.-Dec.	Jan.-Mar.	Mar.-Aug.	Sept.-Oct.
Pteridophyta					
[illegible]	M.S.	x	x	x	x
Cycadaceae					
[illegible]	O.F.	x	-	-	x
Pandanaceae					
[illegible]	M.S.	-	-	-	x
Juncaceae					
[illegible]	M.S.	-	-	x	-
[illegible] var. [illegible]	M.S.	-	-	x	-
Gramineae					
[illegible]	S.W.	-	x	x	-
[illegible]	E.P.	-	-	x	-
Cyperaceae					
[illegible]	M.S.	-	-	-	x
Palmae					
[illegible]	O.F.	x	x	x	x
[illegible]	M.F.	x	x	x	x
Araceae					
[illegible]	M.S.	x	x	x	x
[illegible]	M.S.	x	x	x	x
[illegible]	M.S.	x	x	x	x
Commelinaceae					
[illegible]	M.S.	-	-	x	x
[illegible]	M.S.	-	-	x	x
Amaryllidaceae					
[illegible]	M.S.	-	-	-	x
[illegible]	M.S.	-	-	x	x
Dioscoreaceae					
[illegible] var. [illegible]	M.S.	-	-	x	x
[illegible] var. [illegible]	M.S.	-	-	x	x
Taccaceae					
[illegible]	O.F.	-	x	-	-
Liliaceae					
[illegible]	M.F.	-	-	x	-
Moraceae					
[illegible] var. [illegible]	S.W.	x	x	-	-
[illegible]	M.F.	-	-	x	-
[illegible]	M.F.	-	-	x	-
	S.W.				
[illegible]	M.F.	-	-	x	-
[illegible] var. [illegible]	S.H.	-	-	x	-
[illegible]	M.F.	-	-	-	x
[illegible]	S.W.	x	x	-	-
[illegible]	M.F.	-	x	-	-
Papaveraceae					
[illegible]	M.S.	-	-	-	x
[illegible]	M.S.	-	-	x	x
[illegible]	S.W.	x	x	-	-
Oxalidaceae					
[illegible]	S.W.	x	x	-	-
Sterculiaceae					
[illegible]	S.W.	-	-	x	-
Nymphaeaceae					
[illegible]	E.P.	-	-	x	-
[illegible] var. [illegible]	M.S.	-	-	x	-
Leguminosae					
Caesalpinioideae					
[illegible]	M.F.	x	x	-	-
Papilionoideae					
[illegible] var. [illegible]	M.S.	-	-	x	x
Euphorbiaceae					
[illegible]	M.F.	x	x	-	-
[illegible]	M.F.	-	x	-	-
[illegible]	M.F.	-	-	-	x
Anacardiaceae					
[illegible]	M.F.	x	x	-	-
[illegible]	S.W.	x	-	-	-
[illegible]	M.F.	-	-	-	x
Sapindaceae					
[illegible]	M.F.	x	-	-	-
Vitaceae					
[illegible]	O.F.	x	x	-	-
	M.F.				
[illegible]	S.W.	-	-	x	x
	O.F.				
Tiliaceae					
[illegible]	M.F.	x	-	-	-
	S.W.				
[illegible]	M.F.	-	-	x	-
[illegible]	M.S.	-	-	x	x
Malvaceae					
[illegible]	M.S.	-	-	x	x
[illegible]	M.S.	-	-	x	x
Sterculiaceae					
[illegible]	O.F.	x	-	-	x
[illegible]	S.W.	x	-	-	x
[illegible]	M.F.	-	-	-	x
	S.W.				
Bombacaceae					
[illegible]	S.W.	x	x	-	-
Rutaceae					
[illegible]	M.F.	-	-	-	x
Combretaceae					
[illegible]	S.W.	x	x	x	x
[illegible]	S.W.	x	x	x	x
Myrtaceae					
[illegible]	S.W.	x	-	-	-
[illegible]	S.W.	x	x	-	-
Sapotaceae					
[illegible]	S.H.	x	x	x	x
	O.F.				
[illegible]	M.F.	-	-	-	x
	S.W.				

	Habitat	Wet Season		Dry Season	
		Oct.-Dec.	Jan.-Mar.	Mar.-Aug.	Sept.-Oct.
Ebenaceae					
[illegible]	M.F.	-	-	-	x
	S.W.				
Apocynaceae					
[illegible]	O.F.	-	-	x	x
Convolvulaceae					
[illegible]	M.S.	-	-	-	x
[illegible]	M.S.	-	-	-	x
[illegible]	C.D.	x	x	x	x
[illegible]	M.S.	-	-	x	-
Verbenaceae					
[illegible]	M.F.	x	x	-	-
	S.W.				
Solanaceae					
[illegible]	E.P.	-	-	-	x
Rubiaceae					
[illegible]	M.F.	-	-	x	x

SPECIES OF PLANTS USED AS FOOD BY THE NATIVES OF ARNHEM LAND

HABITAT

M.F. Monsoon forests
S.W. [illegible]
O.F. [illegible]
M.S. [illegible]
E.P. Estuarine areas
S.H. [illegible]
C.D. [illegible]

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Table 49. Edible Wild Plants, Arnhem Land, Australia (McArthur, 1960)

VERNACULAR NAMES OF PLANT FOODS

Botanical name	Name at Groote Eylandt	Name at Yirrkalla	Name at Oenpelli
Nymphaea gigantea Hook. var. *violacea*	mugbuta	burakpar	mundaim
Triglochin procera R. Br. var. *dubia* Benth.	arbulkuma	bulawidja	gug-bum
Eleocharis dulcis (Burm. f.) Trin. ex Hensch.	migara	bimindjera	
Dioscorea sativa L. var. *elongata* F. M. Bail.	mundaigeriera	kunguri gularka	garrabura
Dioscorea sativa L. var. *rotunda* F. M. Bail.	mungura	tjidama mungerri	mungindjerk
Amorphophallus variabilis Blume		birila	
Ipomoea velutina R. Br.	adamia	barwung	morrgier
Vigna vexillata (L.) Benth. var. *youngiana* F. M. Bail.	marmirikwura	jakwa gulbarrong	budtjinbarra
Curculigo ensifolia R. Br.	umdungarungara	jaipingou dongerruk	jarparl mungunggong
Cayratia trifolia (L.) Domin	arrijuwa	bualku jukura gariun	mungudbi
Ipomoea graminea R. Br.	mumundara		
Ipomoea gracilis R. Br.	munginarra		
Ampelocissus acetosa (F. Muell.) Planch.	akwirena (fruit) mijabura (root)	wulinmu (fruit) gunimar (root)	
Cartonema parviflorum Hassk. *Cartonema spicatum* R. Br.	arda		
Boerhaavia diffusa L.	marittja		
Morinda citrifolia L.	mungwuna	burukbiili	
Grewia retusifolia Kurz.	mamurinja	morinji muratjuman	
Ficus henneana Miq.	munjunginja	maunnuinja	
Eugenia suborbicularis Benth.	innamunnunga	la.eni	muntjarruk
Poutevia sericea (Ait.) Bachni	imn ungra	ungarpu	
Brachychiton paradoxum Schott	miaroua	tarrungulk	
Brachychiton diversifolium R. Br.	airitja	nanungowa	
Cycas media R. Br.	mununa	nartu	
Livistona humilis R. Br.	ilerilba	migi	
Kentia ramsayi (Becc.) Becc.			jirrigijirrigi
Terminalia carpentariae C. T. White	mumupura	mumunbul	

Table 50. Nutritional Composition of Selected Edible Wild Plants, Arnhem Land, Australia (Fysh et al., 1960)

NUTRITIVE VALUE OF 100 GM. UNCOOKED EDIBLE PORTION

Botanical name	Per cent edible	Water gm.	Protein gm.	Fat gm.	Carbohydrate gm. by difference	Carbohydrate gm. available	Calories	Crude fibre gm.	Ash gm.	Calcium mg.	Ascorbic acid mg.	Source of sample
Nymphaea gigantea Hook, var. *velutina*	100	56·2	3·5	0·08	37·8	34·2	155	1·5	1·0	51	35	Hemple Bay
Trichodesma zeylanicum R. Br. var. *dubia* Benth.	100	81·6	0·8	0·01	15·5	15·3	67	1·1	0·9	15	8	Hemple Bay
Eleocharis dulcis (Burm f.) Trin. ex. Hensch.	100	77·8	2·0	0·05	18·7	17·7	81	1·1	2·4	6	18	Yurkalla
Dioscorea sativa L. var. *decorata* F. M. Bail.	100	55·3	2·9	0·07	40·1	38·2	170	0·6	1·0	8	52	Yurkalla
Dioscorea sativa L. var. *erecta* F. M. Bail.	100	78·4	2·3	0·02	18·1	19·2	88	0·5	0·8	36	32	Yurkalla
Amorphophallus campanulatus, Blume	55[1]	85·0	1·0	0·02	13·5	13·3	59	0·4	0·1	24	0[2]	Hemple Bay
Ipomoea cordata R. Br.	90	84·0	1·9	0·03	13·1	12·0	57	0·6	1·1	55	6	Melville Bay
Vigna vexillata Benth. var. *lanceolata* F. M. Bail.	100	63·9	1·4	0·11	24·9	21·3	95	2·9	1·7	100	12	Bickerton Island
Canthium coprosmoides R. Br.	58	71·7	2·0	0·02	21·3	18·1	84	4·1	0·9	95	5	Yurkalla
Carissa ovata R. Br.	87	73·8	0·9	0·14	22·1	18·3	81	1·5	1·5	235	18	Bickerton Island
Carissa lanceolata (L.) Domin	94	67·8	1·3	0·05	27·6	23·0	101	1·5	1·8	311	12	Yurkalla
Ipomoea quamoclit R. Br.	100	72·2	1·1	0·03	23·3	20·0	88	1·1	2·0	203	20	Yurkalla
Canna[3]	100	78·5	1·13	0·32	16·5	12·1	57	2·0	1·6	131	—	Bickerton Island
Rubus fruticosus[3]	67	—	1·0	0·21	—	14·2	64	2·3	1·3	181	13	Yurkalla
Cycas media R. Br.[4]	14	73·5	1·7	0·07	21·4	17·6	80	2·4	0·9	197	29	Yurkalla
Hive of the native bee[5]	56	62·8	4·9	0·15	30·8	29·0	133	0·4	1·0	2	—	Milingimbi
Turtle eggs[6] (*a*) small	—	23·0	4·2	2·8	—	30·8	168	—	0·8	29	—	Bickerton Island
(*b*) large	91	80·7	10·7	8·3	—	—	120	—	1·1	70	—	Yurkalla
	87	80·9	10·4	8·1	—	—	117	—	0·9	71	—	

The sign (—) indicates that no analysis was made.

1. This sample had been cooked, peeled, sliced and soaked as described in Section 6. The figure given as per cent edible is the ratio of the weight of food ready for eating to the weight harvested.

2. The raw yam has an ascorbic acid content of approximately 20 mg. per 100 gm., but a negligible amount of ascorbic acid remains after soaking in running water for many hours.

3. This is the native name.

4. The analysis was done on a raw sample. After soaking for several days in running water it would be likely to lose some of its food value due to leaching, as the nuts are pounded before they are put into the water.

5. The analysis was done on the entire hive including the wax.

6. The turtle eggs were coated with animal fat and dispatched by air. They reached Canberra some weeks later. The fat was wiped off and the eggs were weighed. The small eggs showed a loss of weight of almost 20 per cent and the large eggs a loss of 16 per cent. These losses have been assumed to be water losses.

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Table 51. Edible Wild Plants, Leonora, Western Desert, Western Australia (Parker, 1980)

Latin Terminology	Portion Used
Acacia aneura	Seed
Acacia quadrimarginea	Root; Gall
Arthrocnemum leiostachyum	Ash
Atriplex spp.	Ash
Canthium latifolium	Seed
Eremophila spp.	Seed
Eucalyptus leptopoda	Seed; Gall
Hakea suberea	Flower
Leuchardtia australia	Fruit; Flower
Solanum orbiculatum	Fruit

DISCUSSION AND SYNTHESIS

Returning to questions posed at the outset of this report, should agricultural development within the tropical zone of India, East Asia, Southeast Asia, and Oceania consider edible wild plants as a viable research and development focus? Four types of data presented in this report document an unqualified support for such research.

1. While there is abundant information already available identifying important dietary uses of wild plants by agro-pastoral peoples within the study region, these data have not been systematically collected. Despite excellent reports on local plant use within Asia, as evidenced by documentation in this paper, no region within Asia has been examined thoroughly for the potential presence of highly nutritious wild plants. Data presented in this report reveal a high number of wild species utilized by agro-pastoral societies within Asia; the reports presented, however, represent an eclectic, unsystematic attempt to identify potentially useful edible species.
2. It is clear that many societies in Asia focus on domesticated field crops to the near exclusion of wild species. It is also clear that other societies rely heavily on wild plants to provide important energy and nutrients under three types of conditions: A) Minimal but important use throughout the year, B) Major important use at specific periods of the year, especially in the months preceding harvest of domesticated field crops, and C) Major importance during periods of drought (as in the desert portions of India). Wild plants in each area of Asia are climatically adapted to variable conditions, whereas most domesticated field crops are not. Thus, during drought in India wild plants may become the most important determinant whether individuals, families, even villages maintain their nutritional quality.

3. The nutritional role played by wild plants includes basic components of energy (calories) from protein, carbohydrates, and fats, as well as vitamins and minerals. In contrast with Part A (Central and South America and the Caribbean) and Part B (Sub-Saharan Africa) of this report, there are abundant data on the nutritional composition of numerous edible wild species in Asia. Nevertheless, the earlier data primarily focus on energy values and do not include vitamin and mineral reports. Accordingly, while there has been a good beginning to understanding the nutritional composition of Asian wild foods, much still remains to be learned.

4. The nutritional aspect of wild plant research in Asia is but one of several potential agricultural and economic focal areas. In addition to wild plants serving as food resources, wild species offer high potential for economic fiber, oil, dye, drugs/medicine, and a host of other economic possibilities.

Thus, considering agricultural development in its broadest sense, one may make a sound claim that an exciting research area with direct application for agricultural development and economic improvement exists within the theme of wild plant use. A number of recent reports, based on research conducted in the Americas, sub-Saharan Africa, and Asia, build upon this theme of economic development of wild plants, especially the work by Goodspeed (1953), Jackson (1954), Hodge (L958), Terra (1964), Mondonedo (1969), Bates and Hentges (1976), Wilkes (1977), and Vietmeyer (1978; 1979; 1980). These authors suggest strongly that tropical wild plants have not been investigated adequately.

Approaching the question of further research from a complementary perspective is the view of the present author (Grivetti, 1976; 1978; 1979) that

holds agricultural development should not be at the expense of nutritional quality of human diet and that nutritional quality is build on the association common to many agricultural societies of food habits using both domesticated and wild species. Parallel views have been stated by Korte (1969; 1973), Dema (1971), Dewey (1979; 1980), Doughty (1979a; 1979b), and Fleuret and Fleuret (1980) who suggest that agricultural development may not lead to nutritional improvement unless ecological and public health data are used by planners; indeed, nutritional quality of diet may decline with agricultural development (see also Vahlquist, 1972).

Still another parallel view is that of Calloway et al. (1974) who have documented clearly that wild plants not only augment human diet in a positive manner, but that the nutritional content of some wild species may be superior in vitamin and mineral content to widely raised domesticated field crops. Such views support the work of Clarke (1976) and others that agricultural development is important, but should also consider relationships between agriculture, human ecology, and forest-bushland-field crops.

A different argument for suggesting research on edible wild plants should be within the realm of agricultural development is presented by Leroy (1967), Gade (1972), Prance and Elias (1976), and Schultes (1979), that "extinction is forever". These writers suggest that indiscriminate attempts to push back forest margins to bring vast regions under cultivation may result in the extinction of hundreds of plants, not heretofore examined for their potential as economic products of high value. Most ecologists are realists; willing to sacrifice certain species if provided only with the choice of feeding human infants or preserving a plant. But most ecologists — and most human nutritionists — would not be willing to expand crop acreage at the expense of "useless jungle/bushlands" — <u>without first examining the lands for underexploited wild plants</u>

with potential for dietary development or other economic uses. Such an approach is short sighted; with perhaps initial food gains but at an unacceptable price. Without the knowledge on which to base decisions such agricultural planning would exist only in a vacuum.

RECOMMENDATIONS

Accordingly, the following four recommendations are made and follow from data developed in this report:

1. Underutilized/exploited wild plants should be considered a research priority within agricultural development programs sponsored by the Agency for International Development.

2. Local USAID officials should be provided with limited discretionary funding in the range of U.S. $20-30,000 to sponsor systematic economic surveys in target regions whereby wild plants with potential dietary and non-dietary uses could be identified and evaluated for further study.

3. Teams of qualified Anthropologists/Geographers, Botanists, and Nutritionists should be encouraged to apply for such funding to systematically examine and review the potential for further development of wild plants within India, East Asia, Southeast Asia, and Oceania.

4. A systematic effort should be launched to improve the nutritional data base already established on the energy, vitamin, and mineral composition of important edible wild plants found within tropical Asia. Field collections could be returned to Federal or American university laboratories for analysis at relatively little cost — but with enormous nutritional and economic potential.

APPENDICES

APPENDIX 1

ASIAN SEARCH REQUEST

Data Set	Country
1	China
2	Chinese
3	India
4	Bangladesh
5	Pakistan
6	Vietnam
7	Viet Nam
8	Philippines
9	Thailand
10	Korea
11	Burma
12	Taiwan
13	Sri Lanka
14	Ceylon
15	Nepal
16	Malaysia
17	Cambodia
18	Hong Kong
19	Laos
20	Singapore
21	Mongolia
22	Bhutan
23	Macao
24	Maldive Islands

Crossed by

A. Indigenous Plants
B. Wild Plants
C. Gathering
D. Medicinal

Appendix 2 Dictionary of Economic Plants by J. C. Th. Uphof: Sample Pages

DICTIONARY OF ECONOMIC PLANTS

by

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Second Edition
Revised and enlarged

3301 LEHRE
VERLAG VON J. CRAMER
1963

STECHERT-HAFNER SERVICE AGENCY, INC.
NEW YORK, N. Y.

WHELDON & WESLEY, LTD.,
CODICOTE, HERTS.

UNIVERSITY OF CALIFORNIA

APPENDIX 2 (CONTINUED)

Gray Box Eucalyptus — Eucalyptus hemiphloia F. v. Muell.

Gray Chokecherry — Prunus Grayana Max.

Gray Sarsaparilla — Smilax aristolochiaefolia Mill.

Grayish Urceolaria — Urceolaria cinerea Ach.

Grayling — Canthareilus umbonatus Fr.

Great Bulrush — Scirpus lacustris L.

Great Burdock — Arctium Lappa L.

Great Laurel — Rhododendron maximum L.

Greater Galingal — Alpinia Galanga Willd.

Greater Yam — Dioscorea alata L.

Greek Juniper — Juniperus excelsa Bieb.

Greek Turpentine — Pinus halepensis Mill.

Green Amaranth — Amaranthus retroflexus L.

Green, Chinese — Rhamnus dahurica Pall.

Green Ebony — Tecoma leucoxylon (L.) Mart.

Green Pepper — Capsicum frutescens L.

Green Sapote — Calocarpum viride Pitt.

Green Sprangletop — Leptochloa dubia (H.B.K.) Nees.

Green Strophanthus — Strophanthus Kombe Oliv.

Greenbrier, Bristly — Smilax Bona-nox L.

Greenbrier, Long Stalked — Smilax pseudo-China L.

Greenbrier, Saw — Smilax Bona-nox L.

Greenheart — Nectandra Rodiei (Schomb.) Hook.

Greenheart, Demerara — Ocotea Rodiei (Schomb.) Mez.

Greenheart Ebony — Tecoma leucoxylon (L.) Mart.

Greenheart, Surinam — Tecoma leucoxylon (L.) Mart.

Greenleaf Fescue — Festuca viridula Vasey.

Greenmanure — Fertilizers.

Greenwood — Halfordia scleroxyla F. v. Muell.

Greenwattle Acacia — Acacia decurrens Willd.

Greenwood — Sarcobatus vermiculatus (Hook.) Torr.

Grewia sphaerolista Rapal. (Bromeliaceae). - Perennial herb. Chile. Berries called Chupones are edible.

Grenadilla de Quipos — Passiflora Popenovii Killipp.

Grenadilla, Giant — Passiflora quadrangularis L.

Grenadilla, Purple — Passiflora edulis Sims.

Grenadilla Real — Passiflora quadrangularis L.

Grenadilla, Sweet — Passiflora laurifolia Juss.

Grenadille Wood, African — Dalbergia melanoxylon Guill and Perr.

Grenadine — Punica Granatum L.

Grevillea Gilliversii Hook. (Proteaceae). - Tree. New Caledonia. Wood is reddish, fine grained; used for cabinet work.

Grevillea robusta Cunningh. Silk Oak, Warragarra. (Proteaceae). - Tree. Australian, esp. New South Wales, Queensland. Wood light, hard, easily worked; used for cabinet-work, interior finish of houses. Tree used in some countries for shade in coffee plantations.

Grevillea striata R. Br. (syn. G. linearis R. Br.) Beefwood, Turrsac. (Proteaceae). - Tree. Australia. Wood hard, close-grained, takes a good polish; used for furniture, cabinet-work, fancy work.

Grewia asiatica L. Parusha, Phalsa, Palisa. (Tiliaceae). - Small tree. Origin uncertain, probably Trop. Asia esp. India to Siam, Indo-China, Philipp. Islds. Cultivated. Fruits are edible, being sweetish to somewhat acid, well flavored. Has astringent, stomachic, cooling properties. Source of a spirit. Also a sherbet is made from the fruit. Root-bark is used in rheumatism.

Grewia betulifolia Juss. Gazri, Tarakat. (Tiliaceae). - Small shrub. Sahara region esp. Mauritania to Arabia. Fruits are edible, having a flavor of hazelnuts; consumed by the natives.

Grewia bicolor Juss. Imigis. (Tiliaceae). - Shrub or small tree. Senegal, Sahara region. Fruits are edible, consumed by the natives. Leaves are used as soap; they remove fat from cloth.

Grewia carpinifolia Juss. (Tiliaceae). - Shrub. India, Trop. Africa. A decoction of the bark is used by women in some parts of Trop. Africa in washing hair to remove lice.

Grewia celtidifolia Juss. Talok. (Tiliaceae). - Tree. Indonesia, esp. Java. Wood is very durable, elastic; used by the natives for handles of knives and for parts of weapons. Also G. eriocarpa Juss. (syn. G. micrococca Blume).

Grewia elastica Royle. (syn. G. vestita Ball.) Bemlau, Dhamnan, Khursi. (Tiliaceae). - Small tree. Sub Himalaya, India, Bengal etc. Wood greyish white, hard, very tough, elastic; used for tool handles, buggy shafts, plough shafts, spokes of wheels, agric. implements, picker arms and other parts of textile machinery, police batons, furniture, cars, bows, tennis racket frames. Berries are edible, used in sherbets. Lopped branches are used as fodder for livestock.

Grewia excelsa Vahl. (Tiliaceae). - Woody plant. Trop. Africa, Asia. Stem is source of a fiber; used for different purposes.

Grewia fiscerei P. Danz. Hafotra. (Tiliaceae). - Tree. E. Madagascar. Bark is source of one of the best fibres, used by the natives of Madagascar.

Grewia fibrocarpa Mast. Tiendeau, Sorin. (Tiliaceae). - Tree. Malaysia. The fruits are used in the Malaysian Union for sauce, a kind of soup.

Grewia flavescens Juss. Arcelia. (Tiliaceae). - Shrub. Sahara region, Sudan, Senegal. The sweet fruits, called Arcelia, are consumed by the natives.

APPENDIX 2 (CONTINUED)

Grewia laevigata Vahl. (syn. G. [illegible] Burret, [illegible] Tiliaceae). [illegible] tree. Trop. Asia to Australia. The bark of the young trees is used by the natives as cordage.

Grewia macrophylla Bojer (Tiliaceae). Shrub. Madagascar. Bark is source of a fibre; used by the [illegible] of Madagascar.

Grewia mollis Juss. (Tiliaceae). Shrub or small tree. Trop. Africa. Bark is source of a fibre. [illegible] used [illegible] in the Sudan [illegible] consumed by the natives in soups [illegible] dried, [illegible] mixed with [illegible] and made into cakes.

Grewia occidentalis L. (Tiliaceae). Shrub or small tree. [illegible] Africa, esp. Cape Peninsula. Wood is used by the Bushmen [illegible] making bows.

Grewia [illegible] Roxb. [illegible] (Tiliaceae). Shrub or tree. India, Indochina, [illegible]. A decoction of the [illegible] is used in [illegible] A [illegible] of the wood produces a large amount [illegible] an infusion for ailments of the abdomen.

Grewia [illegible] [illegible] Blanco (Tiliaceae). Tree. Philippine Islands. Fruits having the [illegible] of a cherry, yellow [illegible] [illegible]

Grewia populifolia Vahl (Tiliaceae). Woody plant. Trop. Africa. Bark is source of a strong fibre which is used for different purposes by the natives.

Grewia [illegible] Spin. [illegible] (Tiliaceae). Tree. [illegible] Source of [illegible] used by the natives for [illegible] It is supposed to [illegible] effective.

Grewia [illegible] Juss. [illegible] (Tiliaceae). Tree. [illegible] small pear-shaped, yellow [illegible]

Grewia subinaequalis DC. (G. [illegible] L.) [illegible] (Tiliaceae). Large shrub or small tree. [illegible] used for [illegible]

Grewia [illegible] [illegible] (Tiliaceae). [illegible] frames, bent parts of carriages, [illegible] ket [illegible] billiard cues, golf clubs, athletic material, picker arms in textile mills, [illegible] Bark is source of a [illegible] fibre, used as cordage. Lopped leaves and twigs are used as fodder for live stock. Fruit is edible.

Grewia [illegible] [illegible] (Tiliaceae). [illegible] tree. Central Madagascar. The bark is [illegible] of Madagascar. Also G. [illegible] Bak., G. [illegible] Bak., G. [illegible] and G. [illegible]

Grewia [illegible] [illegible] (Tiliaceae). [illegible] Senegal and Mauritania. The sweet fruits are [illegible]

Grias peruviana Miers. [illegible] (Lecythidaceae). [illegible] America, esp. Peru, Colombia and [illegible]. Seedlings [illegible] germinating seeds in [illegible] water are used by the Indians to [illegible]

Grindelia camporum Greene. Gumplant (Compositae). [illegible] plant. [illegible] N. America. Dried leaves and flowering tops are used in [illegible] asthma, bronchitis, [illegible] burns, [illegible] Also G. [illegible] Nutt.

Grindelia [illegible] Nutt. [illegible] (Compositae). [illegible] leaves and young flowering [illegible] is used in [illegible] to "purify" the [illegible] also to relieve throat and lung [illegible]

Grindelia squarrosa (Pursh) Dun. [illegible] (Compositae). [illegible] plant. [illegible] N. America. Dried [illegible] used for burns, ivy poisoning [illegible]

Griselinia [illegible] [illegible] (Cornaceae). Tree. New Zealand. [illegible] compact, [illegible] used for [illegible]

Griselinia [illegible] Forst. (Cornaceae). Tree. New Zealand. Wood compact, dense, very durable [illegible] used for [illegible] and piles.

Gr[illegible] — [illegible] Mason.

Gr[illegible] — L[illegible]

Gromwell, Common — Lithospermum [illegible] L.

Gro[illegible] — Ribes

Ground Blueberry — Vaccinium Myrsinites Lam.

Ground Cherry — Physalis heterophylla Nees

Gr[illegible] — [illegible]

G[illegible] — [illegible] L.

Ground Nut — Arachis hypogaea L. and Apios tuberosa Moench.

Appendix 3 Tanaka's Cyclopedia of Edible Plants of the World by T. Tanaka, Edited by S. Nakao: Sample Pages

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Tanaka's Cyclopedia of EDIBLE PLANTS of the World

By

Tyōzaburō Tanaka

Edited by

Sasuke Nakao

1976

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APPENDIX 3 (CONTINUED)

Agastache rugosa 20

Agastache rugosa O. KZE. (Lamiac.) "*Kawa-midori*" "Kkai-namul" (Korea) The young shoots with leaves are used as boiled vegetable. Japan; Korea; China: HAYASHI 1942

Agastache urticifolia O. KZE. (Lamiac.) Seeds are eaten. U. S.: YANOVSKY 1936

Agathisanthes javanica → Nyssa javanica

Agathophyllum aromaticum → Ravensera aromatica

Agave altissima → Agave americana

Agave americana LINN. (Amaryllidac.) "Century plant" "*Ryuzetsu-ran*" Previous to the lengthening of the central bud, it is cut off; and the sugary liquid thus obtained is fermented into "pulque" spirit. In time of scarcity the flowering stalk and the pulp of the lower part of the leaf are used for food.—Japan (introd. for gardening); Mexico; W. Indies, introd. into many countries as an ornamental plant: DASTUR 1951, UMEMURA 1907 etc.

Agave atrovirens KARW. (Amaryllidac.) "Maguey" "Pulque agave" From the flower stalk, a kind of sap is derived. An intoxicating drink is brewable from it. The flower stalk is roasted and eaten by the natives. The heart of the plant is also edible. The "pulque" is the spirit distilled from the sap of this plant. Mexico. HILL 1937, NEAL 1948, etc.

Agave Cantala ROXB. (Amaryllidac.) "*Kantara-asa*" "Maguey" Stem heart is eaten raw or steamed. The juice obtained from flower stalks is used in Mexican intoxicating drink, pulque and mescal. Mexico; introd. into Trop. Asia: HILL 1937, MERRILL 1943, etc.

Agave complicata TREL. (Amaryllidac.) A fine liqueur Comiteca is distilled from fermented sugar cane juice and mash of an Agave species. Mexico. UPHOF 1968

Agave crassispina TREL (Amaryllidac.) "Maguey manso" Source of pulque, one kind of spirits. Mexico: UPHOF 1968

Agave deserti ENGELM. (Amaryllidac.) Flower stalks, when elongated as long as six to eight inches, are cut off and baked, they furnish a sticky, sweet cake. To get similarly sweet, juicy foodstuff, leaf bases are roasted in pits lined with stones. They are also brewed into a liquor. Seeds are pounded into flour. S. W of U. S.: UPHOF 1968, WEIMER 1934, YANOVSKY 1936

Agave Houlletiana → Agave sisalana

Agave laevis → Agave sisalana

Agave melliflua → Agave atrovirens

Agave Palmeri ENGELM. (Amaryllidac.) Bases of leaves provide a sweet juicy food by roasting. New Mexico; Arizona: YANOVSKY 1936

Agave Parryi ENGELM (Amaryllidac.) Flower stalks are roasted in stone-lined pits. Tender leaves are also eaten. Southwestern N. America. MEDSGER 1939, Yanovsky 1936

Agave scabra SALM-DYCK. (Amaryllidac.) Bases of leaves are roasted and consumed. Texas: YANOVSKY 1936

Agave Shawii ENGELM. (Amaryllidac.) PALMER reports that the sweet nectar in the base of flowers is used in California. California: YANOVSKY 1936

Agave sisalana PERR. et ENGELM. (Amaryllidac.) "Sisal hemp" The heart of the plant and inner portion of the leaf are eaten in Java. The sap from the cut end of flower stalk is distilled to brew a kind of brandy. Indonesia, India, Pakistan; Centr. America. DASTUR 1951, OCHSE 1931, JU. SATO 1950

Agave sisaiii → Agave sisalana

Agave spectabilis → Agave americana

Agave utahensis ENGELM. (Amaryllidac.) "Utah aloe" Bulbous roots are eaten by the Indians.

APPENDIX 3 (CONTINUED)

Prunus Davidiana FRANCH. (Rosac.) "Shan-mao-t'ao" (China) "*Manshu-no-momo*" "David peach" Kernels are used in China to flavor confectionary and some special dishes, but they contain prussic acid. Manchuria; China; Mongolia: ISHII 1955, MEYER 1911

Prunus dehiscens → Prunus tangutica

Prunus demissa → Prunus virginiana var. demissa

var. melanocarpa → Prunus virginiana var. melanocarpa

Prunus depressa → Prunus pumila var. depressa

Prunus diffusa → Prunus microcarpa

Prunus divaricata → Prunus cerasifera var. divaricata

Prunus domestica LINN. (Rosac.) "(Common garden) plum" "*Seiyô-sumomo*" "Alucha" (Hind.) "Prune" (Fr.) Fruit is eaten fresh, canned, made into jam, preserves and various sorts of intoxicating beverages. Introd. into Japan; Temp. Zone: HILL 1937, HU 1955, LE MAOUT & DECAISNE 1873, KIKUCHI 1944, NAKAO 1973, WEALTH OF INDIA 1969, etc.

var. institia → Prunus institia

var. italica SCHNEID. "Green gage" Fruit is a kind of plum, edible. Europe; U. S.: BAILEY 1916, 1949

Prunus donarium SIEB. (Rosac.) "*Sato-zakura*" Flowers are eaten, stored in salt and put into tea; in Fukushima Pref., Japan, they are made into wine. Japan: MATSUSHIMA 1935

Prunus duracina → Prunus Avium var. duracina

Prunus effusa (HOST) SCHNEID. (Rosac.) "Duke cherry" "Cerise royale" (Fr.) Fruit is edible. Introd. into Japan; Europe; America. BAILEY 1916

Prunus elliptica → Elaeocarpus sylvestris var. ellipticus

Prunus emarginata WALP. (Rosac.) "Bitter cherry" Fruit is eaten occasionally. Western N. America: YANOVSKY 1936

Prunus eminens BECK. (Rosac.) Fruit may be edible. A hybrid of P. Cerasus with P. fruticosa. Austria: REHDER 1954

Prunus fasciculata A. GRAY (Rosac.) "American almond" No record is found for the edibility, though the kernel is possibly edible. Western N. America: REHDER 1954, TANAKA (Syst. Pomol.) 1951

Prunus Fenzliana FRITSCH (Rosac.) Fruit may be edible, but it is uncertain whether the pulp or the kernel is eaten. Caucasia: BAILEY 1914, TANAKA (Syst. Pomol.) 1951

Prunus Fontanesiana SCHNEID. (Rosac.) Fruit may be edible, somewhat bitter. Prunus Avium x P. Mahaleb. U. S.: REHDER 1954

Prunus fruticosa PALL. (Rosac.) "Dwarf cherry" Fruit is edible, though very acid. Siberia; Europe. STURTEVANT 1919

Prunus glandulosa THUNB. (Rosac.) "*Hosoba-niwa-ume*" "Mai-li" (China) Fruit is preserved or pickled and eaten. Japan; N. & Centr. China: HU 1955, KAIBARA 1708, UMEMURA 1906

Prunus gracilis ENGELM. et GRAY (Rosac.) "Oklahoma plum" Fruit is edible, made into jelly. It is dried for winter use and made into candy. Western U. S.: UPHOF 1968

Prunus Grayana MAXIM. (Rosac.) "*Uwamizu-zakura*" "Gray's cholecherry" Fruit is edible, preserved in salt. Flower buds are similarly preserved. Hokkaido; Honshu; Shikoku; Kyushu; N. China: ARMY VET. MED. 1943, KASHIWAGI 1935, OKAMOTO 1930, SAKABA 1942, UMEMURA 1906, etc.

Prunus gymnodonta KOEHNE (Rosac.) Fruit may be edible. Manchuria; introd. in U. S.: REHDER 1954

Appendix 4 Useful Plants of India and Pakistan. A Popular Handbook of Trees and Plants of Industrial, Economic, and Commercial Utility by J. F. Dastur: Sample Pages

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USEFUL PLANTS OF INDIA AND PAKISTAN

A Popular Handbook of Trees and Plants of Industrial, Economic and Commercial Utility

By

J. F. DASTUR, F.N.I.
(Indian Agricultural Service, Retired)

With 66 Illustrations

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APPENDIX 4 (CONTINUED)

31. ANACARDIUM OCCIDENTALE LINN.

Family: *Anacardiaceae*

Local Names: Hijli-badam, kaju.

English Names: Cashew Apple, Cashew Nut.

Description: A small or medium-sized evergreen tree; branches glabrous, smooth. Leaves entire, very leathery, obovate or oblong, 4-7 in. long. Flowers unisexual and bisexual on the same tree, in large, terminal, bracteate panicles; sepals downy; petals linear-lanceolate, yellow with pink stripes, 0.5 in. long; stamens 10, one longer than the others. Nut kidney-shaped, 1 in. long, seated on the flower-stalk enlarged into a thick, fleshy, pear-shaped, orange or red coloured "apple," 2-3 in. long. Seed kidney-shaped, oily.

Distribution: A native of South America, but now well established in the coastal regions of South India, Chittagong and the Andaman Islands.

Uses: The wood is reddish brown and moderately hard, it is useful for making tea-chests, indigo-boxes, packing cases, charcoal, and for boat building.

The bark yields a bright yellow gum which is an insect repellent; it is therefore used for binding books in place of acacia gum. The juice from the bark is employed for marking linen indelibly and for tanning fishing-nets. A yellow dye is also extracted from the bark.

A black, acrid, oily juice is obtained from the woody shell of the nut; two of its constituents are the phenolic compound "cardol" and anacardic acid; as a preservative against attacks of insects and white ants the juice is painted on timber, wooden rafters, floors, boats, books, etc. It serves as a good water-proofing agent and as a tan for fishing-nets. It is also used for tattooing, removing warts, and for marking linen indelibly. The corrosive oil resulting from the destructive distillation of the shell is used for making stove enamel paint.

Semi-solid to solid resins are prepared from the juice of the shell mixed with the juice from the shell of "bhilawan" (*Semecarpus anacardium*); these resins are employed for making enamels, varnishes, water-proofing compositions and moulding powders.

The seed is edible after it is roasted; it is very nutritious.

The "apple" or the enlarged stalk is very juicy, edible and rich in vitamin C. Its juice makes a very pleasant beverage, by fermentation vinegar is made and also the well-known "kaju" wine. A preserve is made from the "apple."

Medicinally the juice from the shell of the nut is used as a vesicant and rubefacient.

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Appendix 5 Wild Edible Plants of India by H. B. Singh and R. K. Arora: Sample Pages

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WILD EDIBLE PLANTS OF INDIA

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NEW DELHI 1972

APPENDIX 5 (CONTINUED)

tracts particularly common in north-eastern India where both wild and cultivated types occur. The underground farinaceous tubers or corms, elongated to roundish in shape, are consumed after boiling. They are also eaten fried.

Costus speciosus (Koenig Sm. *Keukenda* (Zingiberaceae). A tall herb found in the humid tropical-subtropical tracts, extending to sub-Himalayan region. The rhizome is edible.

Curcuma amada Roxb. Mango ginger, *aam haldi* (Zingiberaceae). A herb found wild in parts of West Bengal, Konkan and Tamilnadu chiefly in humid tracts. The rhizomes are used as condiments. It is also cultivated.

C. angustifolia Roxb. East Indian arrowroot, Travancore starch, *tikhur* (Zingiberaceae). A herb occurring in central India, West Bengal, western ghats and in the sub-Himalayan tract Kumaon eastwards. The starchy rhizomes are used as a substitute for the true arrowroot powder; the sun-dried tubers are ground into flour.

C. leucorrhiza Roxb. *Tikur* (Zingiberaceae). A herb found in eastern India, in Bihar and West Bengal. The rhizomes are utilized for starch preparation.

C. [illegible] Rosc. (Zingiberaceae). A herb found mainly in the humid parts of the western ghats. The starchy rhizomes are edible.

C. [illegible] Roxb. (Zingiberaceae). A herb found in Bihar and West Bengal. The rhizomes are utilized as a source of starch.

C. [illegible] Rosc. *Zedoary, kachura* (Zingiberaceae). A herb found wild in the eastern Himalayas and in western ghats. The large fleshy rhizomes are rich in starch and are used as a substitute for arrowroot. It is also cultivated.

**Cyperus bulbosus* Vahl, *mothe* (Cyperaceae). A sedge found widely in peninsular region. The small tubers are eaten roasted or dried and pounded into flour. They can be baked into a bread or cooked as pudding.

C. esculentus Linn. Tiger nut, *chufa, chufas* (Cyperaceae). A perennial sedge found in northern hills and Nilgiris and other higher hills of western ghats. The tubers are eaten cooked as vegetable or roasted and eaten.

**Decalepis hamiltonii* Wt. and Arn. (Asclepiadaceae). A climbing shrub found mainly in western peninsula and Andhra Pradesh. The aromatic roots are used as spices and condiments. They are also pickled with lime or as such.

**Dioscorea bulbifera* Voight. Syn. *D. glabra* Roxb. (Dioscoreaceae). A climber found in the humid tropical-subtropical tracts, extending to the Himalayas, also found in Nicobar and Andaman Islands. The earth-skinned tubers with white flesh, usually buried deep in the ground are uprooted and eaten.

**D. hispida* L. Potato yam, *ratalu* (Dioscoreaceae). A prickly climber found in the humid tropical-subtropical tracts, extending to the Himalayas. The dull brownish tubers with yellowish flesh are edible.

**D. hamiltonii* Hook f. (Dioscoreaceae). A climber found in the humid tropical tracts all over India. The large deeply buried tubers are delicious to eat. It is the most esteemed of wild yams in Kerala.

**D. kingii* Dennst. Syn. *D. tomentosa* Roxb. *kendu* (Dioscoreaceae). A climber found in the humid parts of western and eastern India, and in the sub-Himalayan region. The depressed globose, lobed tubers which are usually borne close to the soil surface yield edible flour after processing.

D. oppositifolia Linn. *Kasta-alu* (Dioscoreaceae). A climber found in the western ghats and other humid tropical-subtropical tracts. The red-skinned deep seated tubers are with soft white flesh and are eaten.

D. pentaphylla Linn. *Bhara, kanta-alu* (Dioscoreaceae). A climber found all over India except in the drier areas. The brownish-skinned tubers are eaten after boiling.

D. pubera Bl. Syn. *D. anguina* Roxb. *Kasa-alu* (Dioscoreaceae). A climber found in the humid parts of western and eastern India and in the sub-Himalayan tract. The tubers are consumed after boiling.

D. quinata Wall. (Dioscoreaceae). A climber found in the north-western Himalayas. The whitish tubers are eaten.

D. sativa Royle (Dioscoreaceae). A climber found in the north-western Himalayas. The tubers are eaten.

D. tenuiflora Wall. (Dioscoreaceae). A climber found in the eastern peninsular region. The underground tubers as well as the aerial bulbils are eaten.

Dioscorea [illegible] Prain. (Labiatae). A herb of western Himalayas. The roots are reported to be used as a vegetable.

Eleocharis dulcis Trin. Syn. *E. plantaginea* R. Br. (Cyperaceae). A sedge met within tropical-subtropical tracts except in the drier areas. The dark brown, round to onion-shaped starchy tubers are eaten.

**Eriosema chinense* Vog. *kendu* (Papilionaceae). A herb or an under-shrub found in the humid tropical-subtropical tracts; also in the sub-Himalayan region, Kumaon eastwards. The tubers are eaten raw. (Fig. 3).

Eulophia campestris Lindl. (Orchidaceae). The tubers of this east Himalayan orchid are eaten.

Gastrochilus panduratus Ridley (Zingiberaceae). A perennial herb found in Konkan and in the Andaman Islands. The rhizomes are used as a spice/condiment.

**Hitchenia cassina* Baker, Indian arrowroot, *tikhur* (Zingiberaceae). A under-shrub found in the western ghats in Maharashtra (Mahabaleshwar

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APPENDIX 5 (CONTINUED)

Fagopyrum esculentum Moench. Perennial buckwheat. *Bhaigal* (Polygonaceae). A tall herb found in the western Himalayas eastwards to Khasi hills. The leaves are used as a vegetable.

Garcinia lanceifolia Roxb. Guttiferae. A tall evergreen tree occurring mainly in Khasi hills and adjoining mountains. The subacidic leaves are eaten cooked by the Maiars.

Gardenia campanulata Roxb. *Bhiram* (Rubiaceae). A shrub or small tree of eastern India. The leaves are cooked as a vegetable.

Garuga pinnata Linn. *Salmalwaiy* (Burseraceae). A semi-deciduous tree common in drier parts of India. The leaves are eaten as vegetable.

Gymnema sylvestre R.Br. *Gymnar* (Asclepiadaceae). A woody climber occurring in peninsular India. The leaves are eaten as a vegetable.

Hedyotis corymbosa (Linn.) (Rubiaceae). A herb found in north-eastern India. The leaves are eaten.

Hibiscus surattensis Linn. *Ranbhendi* (Malvaceae). A weak-stemmed trailer found in tropical peninsular region. The leaves and tender stems are eaten. *H. ficulneus* also does likewise.

Holarrhena antidysenterica Roxb. Schum. Syn. *H. pubescens* Wall. *Chiraul* (Apocynaceae). A flowering tree occurring all over India except in drier tracts. The leaves are used as a vegetable.

Houttuynia cordata Thunb. (Saururaceae). A perennial herb occurring in Assam, Bihar and eastwards to north-eastern hills. The plant is consumed as a food and is cooked.

Hygrophila spinosa Nees Syn. *H. auriculata* auct. non R.Br. (Acanthaceae). A tall herb occurring in river plains. The leaves are eaten as a pot herb.

Hygrophila T. Anal. Syn. *Barleria longifolia* Nees (Acanthaceae). A herb found commonly in the peninsular tracts. The leaves are eaten.

Jeffersonia anemonoides DC. Sinan. *Jamun* (Berberidaceae). A tall Himalayan herb. The leaves are sour and used as food.

Ipomoea reniformis Chois. *Swamp cabbage*, *Kanda*, *Kanda*, *Jhanjhiya*, *Gaon kalmi saag*. An aquatic trailing herb found widely in river beds. The leaves and shoots are eaten cooked as a vegetable. Fig. [illegible].

Ipomoea Roxb. and Schult. *Hanumankanda* (Convolvulaceae). A climber occurring throughout India except in dry areas. The leaves are eaten by the Santals as a pot herb.

Ipomoea Roxb. and Schult. Syn. *I. reniformis* R.Br. *Gaon saag* (Convolvulaceae). A climber found throughout India. The leaves and shoots are used as a vegetable.

Ipomoea Linn. *Gaon kalmi* Syn. *Ipomoea* Roxb. (Convolvulaceae). A trailing herb found throughout India in wet places and ponds. The leaves are used as a vegetable.

I. reniformis Choisy (Convolvulaceae). A procumbent plant occurring in peninsular region in waste places particularly in black cotton soils. The plant is eaten as a potherb.

Ipomoea Roxb. and Schult. (Convolvulaceae). A trailing herb found in peninsular region, except in drier areas, especially in moist places. The plant is eaten as a vegetable.

Lactuca indica Linn. (Compositae). A herb found in the western Himalayas. The leaves are eaten.

Lamium album Linn. White dead nettle (Labiatae). A herb occurring in western Himalayas. The young shoots are used as a vegetable.

Lantana camara Linn. Moore. Syn. *Lantana aculeata* Roxb. *Tikrem* (Verbenaceae). A naturalised shrub common in peninsular region. The leaves are eaten cooked with rice.

Lapsiana lanceolata Wt. (Compositae). A naturalised plant found in higher peninsular hills and in the Himalayas. Young shoots are eaten after boiling.

Lasia spinosa (L.) Thw. Syn. *L. heterophylla* Schott. *Kanchuria* (Araceae). A tall herb found in lower Himalayas, and eastwards to West Bengal and north-eastern hills. The young leaves are eaten as vegetable and are used in curries.

Leucas aspera (Willd.) Link. (Compositae). A herb common throughout India. The leaves are used in curries in parts of western India.

Leucas cephalotes (Roxb.) Spreng. Syn. *Phlomis cephalotes* (Roxb.) (Verbenaceae). An evergreen shrub found in moist deciduous forests of peninsular India extending to north-eastern hills and lower Himalayas. The tender shoots are used as a pot herb.

Leucas martinicensis Ronde. ex. Hornem. *Drona pushpi*. (Labiatae). A tall herb found throughout India except in dry tracts. The leaves are eaten.

Leucas aspera Spr. (Labiatae). A herb occurring throughout India. The plant is used as a potherb.

Leucas lavandulaefolia Sm. *Dronapushpi*, *Gomasta*, *Gomti*. (Labiatae). A tall herb common on plains and lower hills of Himalayas, often seen as a weed. The leaves and young shoots are eaten as a potherb.

Leucas stelligera Hook.f. (Labiatae). A common weed of cultivation in Chota Nagpur in Bihar. The leaves are eaten as a potherb.

Leucas urticifolia Wall. (Labiatae). A tall herb occurring throughout India in plains and hills. The leaves and young shoots are eaten as a potherb.

Leucas zeylanica Vahl. (Labiatae). A common weed throughout India in plains and hills except in drier region. The plant is eaten as a pot herb by Santals.

Lepidagathis cuspidata Mull. N.E.Br. Syn. *Dicliptera cuspidata* Nees. *Kanchuria* (Acanthaceae). A herb confined mainly to eastern India [illegible]

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APPENDIX 5 (CONTINUED)

India. The leaves are eaten cooked with fish and meat by the Mikir tribals.

Origanum vulgare Linn. (Labiatae). A herb found mainly in the Himalayan tract. The leaves are eaten as a pot-herb in Lahul.

Ottelia alismoides Pers. (Hydrocharitaceae). A common aquatic herb. The leaves and petioles are consumed as a vegetable.

•*Oxalis acetosella* Linn. Common wood sorrel (Oxalidaceae). A creeping herb occurring in Himalayas and higher tropical hills. The acidic leaves are eaten. (Fig. 10).

O. corniculata Linn. India sorrel, *khatti-buti, chempa-methi, amrul-saj, ambeta* (Oxalidaceae). A creeping herb common throughout India. The acidic leaves are eaten as salad or as spinach.

O. martiana Zucc. Syn. *O. corymbosa* DC. (Oxalidaceae). A creeper found in higher tropical hills and in the Himalayas. The acidic leaves are eaten by the hill people.

Oxyria digyna Hill. (Polygonaceae). A herb found in western Himalayas. The leaves tasting like sorrel can be eaten raw or in the form of chutney.

Paederia foetida Linn. (Rubiaceae). A climber found in eastern, mainly hilly tracts. The leaves are made into stews and curries.

Paeonia emodi Wall. (Ranunculaceae). A herb found in western Himalayas. The young shoots are eaten as a vegetable.

Paracis salicifolia Hk.f. (Rubiaceae). A shrub confined to north-eastern hills. The leaves are eaten cooked.

Pavonia odorata Willd. (Malvaceae). A perennial herb common in open woods and wastelands in peninsular region. The leaves are edible.

Pegia nitida Colebr. Syn. *Tapiria virata* Hk.f. (Anacardiaceae). A small tree of north-eastern hills. The leaves are eaten as vegetable by the Mikirs.

•*Perilla frutescens* (L.) Britt. Syn. *P. ocymoides* L. (Labiatae). A tall aromatic herb found mainly in the Himalayas and north-eastern hills. The leaves are eaten by the hill people. Much grown as a courtyard plant by hill tribals of eastern region.

•*Phytolacca acinosa* Roxb. Sweet Belladona, Indian Poke, *matapar, saranga* (Phytolaccaceae). A fleshy herb occurring in western Himalayas eastwards to Assam hills. The leaves and twigs are cooked as a vegetable. It is also cultivated in the Himalayas. (Fig. 11).

Picris hieracioides Linn. (Compositae). A herb found in Kashmir eastwards to Khasi hills, also in Nilgiris. The plant is eaten as pot-herb.

Pleuriogna malabaricum Linn. Syn. *Bauhinia malabarica* Roxb. Malabar mountain Ebony, *amli, kusumsar* in Bihar (Caesalpiniaceae). A tree common in peninsular tracts. The young shoots with leaves (which are acidic) are eaten by Bihar tribals.

Pleurostylia opposita Wall. Syn. *P. wightii* Wight. Lettuce tree (Nyctaginaceae). A small evergreen tree wild in the lowlands forests of Andaman, Nicobars

and Laccadive Islands. The leaves are eaten. The tree lettuce grown chiefly along sea coast is considered to be a cultigen of this.

•*Polygonum alpinum* All. (Polygonaceae). A herb found in western Himalayas. The plant is eaten raw or cooked and is said to taste like rhubarb.

P. aviculare Linn. *Mahuti, bancmalin* (Polygonaceae). A herb found in the Himalayas from Kashmir to Kumaon. The plant is eaten as a vegetable.

P. bistorta Linn. Syn. *P. polystachyum* Wall. ex Hk.f. Bistort, snakeroot (Polygonaceae). A herb found in western Himalayas eastwards to Assam and adjoining hills. The plant is used in stews and soups.

P. chinense Linn. (Polygonaceae). A rambling undershrub found all over India especially in the hills. The plant is used in preparation of curries.

P. glabrum Willd. (Polygonaceae). A tall herb common in wet lands. Young shoots are cooked and eaten.

P. limbatum Meissn. (Polygonaceae). A herb found in swamps all over India. The leaves are eaten as a vegetable.

P. microcephalum D. Don (Polygonaceae). A herb mainly confined to north-eastern hills. The young tops are used for flavouring other vegetables.

P. minus Huds. (Polygonaceae). A slender herb occurring in Himalayas. The leaves are eaten in curries.

•*P. molle* D. Don. Syn. *P. pensylvanicum* Bl. (Polygonaceae). A shrubby plant found in central Himalayas eastwards to Mishmi hills and in Nilgiris. The young shoots are pleasantly acidic and eaten like rhubarb; also used in the preparation of jelly.

P. nepalense Meisn. Syn. *P. glabrum* Buch.-Ham. (Polygonaceae). A herb found in the humid parts of India, extending to Himalayas. The leaves are eaten cooked.

P. orientale Linn. Prince's feather (Polygonaceae). A herb or an under-shrubby plant found in western peninsula and north-eastern region. The shoots possess sour taste. The plant can be eaten as a pot-herb.

•*P. perfoliatum* Linn. (Polygonaceae). A rambling shrub occurring in Himalayas eastwards to Khasi hills. The plant has a pleasant acid taste and is wholesome. It is eaten in north-eastern hills.

P. plebeium R. Br. (Polygonaceae). A prostrate herb common throughout India. The plant is used as a vegetable.

P. polystachyum Wall. ex Meissn. (Polygonaceae). A perennial herb found in the Himalayas eastwards to Mishmi and other hills. The young leaves are eaten as pot-herb. The stalks are consumed either raw after peeling or stewed like rhubarb.

P. pulchrum Bl. Syn. *P. tomentosum* Willd. non Schreil. (Polygonaceae). A herb occurring in peninsular region, particularly along eastern and western coast and in Andaman Islands. The leaves are used as salad.

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APPENDIX 5 (CONTINUED)

Bombax ceiba Linn. Syn. *Bombax malabaricum* DC. Silk-Cotton Tree, *simal* (Bombacaceae). A tall deciduous tree found wild in hotter dry-humid tropical-subtropical tracts of peninsular India. The flower buds, as also fleshy calyx is edible.

•*Calligonum polygonoides* Linn. (Polygonaceae). A shrub of arid regions found in Rajasthan and adjoining tract. The flowers are eaten cooked with oil. They are also made into a bread.

•*Capparis decidua* Forsk. Syn. *C. aphylla* Roth, *ker* (Capparidaceae). A leafless hardy and spiny shrub met with in hotter parts of India. The flowers and buds are eaten as vegetable or pickled as chutney.

Capparis Linn. Capers, *kiriyat* (known Capparidaceae). A shrub, found in hotter parts of north-western region, extending southwards. The flower buds are used as condiment.

Cardamine hirsuta Linn. var. *palustris* Hook.f. and Thoms. Bitter cress (Cruciferae). A herb of temperate tracts, also occurring as winter weed in Bengal. The flowers are used as juice.

Caryota urens Linn. Toddy palm, *wari*, Rampoah Palmyra (Palmeae). A tall palm occurring mainly in humid parts of peninsular region. The cabbage or terminal bud is edible. It is eaten raw or cooked as a vegetable or even pickled.

Cassia siamea Lamk. (Syn. *C. florida*) (Caesalpiniaceae). A tree found mainly in western peninsula. The flowers are eaten.

Cassia tora Linn. Syn. *C. obtusifolia* (Caesalpiniaceae). A small shrub occurring throughout the [illegible] tracts, extending to lower Himalayas. The flowers are used as condiment.

Caryota urens Roxb. Bun palm, *kajur* (Palmeae). A tall palm occurring in humid parts of India and in Andaman Islands. The buds are used as vegetable.

Diospyros peregrina Bth. & Hk.f. (Sapotaceae). An evergreen tree found in north-eastern hills. The flowers are edible.

•*Aegle marmelos* Linn. (Rutaceae). A tall evergreen tree of arid tropical tracts, [illegible] in western, eastern, and [illegible] (Fig. 22).

Butea monosperma [illegible]. A tall deciduous tree found in tropical—subtropical parts throughout India. The flowers are eaten.

Dioscorea pentaphylla Linn. *Hawa* (Dioscoreaceae). A climber found throughout India except in dry regions, more common in humid tropical tracts. The flower buds, [illegible] and tubers, are used as a vegetable.

Dolichos lablab Roxb. Syn. *Lablab vulgaris* Roxb. (Moraceae). A [illegible] found in humid tropical region. The buds and the inflorescence are eaten as a vegetable.

Eugenia jambolana Wall. (Myrtaceae). An evergreen tree found in north-eastern hills. The calyx is eaten cooked.

Hoya [illegible] (Roxb.) K. Sch. Syn. *H. needa* Wall. *Garsi* (Asclepiadaceae). A shrub occurring throughout India. The flowers are eaten as a vegetable.

Indigofera [illegible] Buch.-Ham. *Kirsh, shegli* (Papilionaceae). A shrub found in eastern Himalayas, extending eastwards to Assam hills. The flowers are eaten as a vegetable.

Indigofera Roxb. *Rikra, tekra* (Papilionaceae). A shrub found throughout peninsular region, extending to sub-Himalayan tract. The pink flowers are used as a vegetable.

•*Madhuca indica* Gmel. Syn. *Bassia latifolia* Roxb. Mahua tree, Illipe butter, *mahua, mowa* (Sapotaceae). A tall tree common in peninsular India. The flowers (sweet succulent Corolla) are eaten raw or cooked and even made into sweet meats, also brewed into a local beer, much consumed by the tribals. (Fig. 16).

M. malabarica (Bedd.) Parker Syn. *Bassia malabarica* Bedd. (Sapotaceae). A tall evergreen tree found in humid parts of western ghats. The flowers are eaten.

Monochoria hastatifolia Prain. (Pontederiaceae). An aquatic herb found throughout India along margin of ponds and marshy lands. The inflorescence is eaten.

•*Nelumbo nucifera* Gaertn. Syn. *Nelumbium speciosum* Willd. Lotus, *kamal* (Nymphaeaceae). An aquatic herb found throughout India in ponds. The flowers, often buds, are eaten. (Fig. 17).

Nymphaea lotus Burm. f. Syn. *N. lotus* Hook. f. & Th. White Lotus, *swadi* (Nymphaeaceae). An aquatic herb occurring in ponds throughout India. The flowers are edible.

N. pygmaea Georgi Syn. *N. pygmaea* Ait. Pygmy water lily (Nymphaeaceae). An aquatic herb occurring in Himalayas eastwards to Khasi hills. The flowers are eaten.

Oxystelma esculentum Wt. & Arn. *Malang ai* (Asclepiadaceae). A leafless shrub found in hotter parts of northern India, Rajasthan and in the Himalayan foothills. The flower buds are eaten as a vegetable.

Pergularia pallida Decne (Asclepiadaceae). A hardy shrub chiefly found in drier parts of northern-north-western India. The sweet flower-buds are eaten raw or cooked as vegetable.

Polygonum [illegible] Buch.-Ham. Syn. *P. [illegible]* Roxb. ex Bem. Polygonaceae. A creeping herb occurring in the Himalayas from Kashmir eastwards to Khasi hills. The flowers are eaten.

•*Rhododendron arboreum* Sm. (Ericaceae). A handsome tree occurring in temperate Himalayas and higher hills of western ghats and north-

APPENDIX 5 (CONTINUED)

throughout India. The large apple-size fruits possess aromatic pulp which is taken as such or with sugar in sharbats; also used in preparation of chutneys and jellies. (Fig. 28).

Ficus aurantiaca Lour. Syn. *F. roxburghii* Wall. *Tiula, tarwal* (Moraceae). A tall tree found in the sub-Himalayan region, north-eastern hills, and parts of eastern India. The brownish insipid fruits are used for making jams.

•*F. glomerata* Roxb. Cluster fig, *gular, dumoor* (Moraceae). A tree found throughout India, extending to the sub-Himalayan region. The fruits which are smaller than the cultivated fig become reddish on maturity and have the flavour of cidar apple. These are used for making jellies. The roasted fruits are said to form an important breakfast with milk and sugar. (Fig. 29).

F. hispida Linn.f. (Moraceae). A tree found throughout India; also in outer Himalayas and Andaman Islands. The ripe fruits are made into jellies.

F. palmata Forsk. *Anjiri, bela, khasi* (Moraceae). A tree found in the Himalayas, Kumoan eastwards and in the hilly peninsular tracts. The fruits are edible.

F. rumphii Bl. (Moraceae). A tall tree found in the sub-Himalayan tract and in the peninsular region. The ripe fruits are eaten.

F. semicordata Buch.-Ham. ex Smith. Syn. *F. cawa* Buch.-Ham. *Khanan* (Moraceae). A tree found in the sub-Himalayan tract, western and north-eastern India, often along streams. The ripe fruits are taken raw and also made into jams.

Fissistigma polyanthum Merrill Syn. *Melodorum polyanthum* Hk.f. & Thoms. (Annonaceae). A climber found in north-eastern hills. The ripe fruits are with aromatic pulp.

F. tomentosum Merrill Syn. *Melodorum tomentosum* Hk.f. and Thoms. (Annonaceae). A climber found in north-eastern hills. The ripe cherry-size berries with aromatic pulp are much relished.

•*Flacourtia indica* Merr. Syn. *F. ramontchi* L'Herit. *Kusai* (Flacourtiaceae). A thorny shrub found throughout India. The small uniform berries are acidic and consumed raw; also good for making jellies, jams and tarts.

•*F. jangomas* (Lour.) Raeusch. Syn. *F. catafracta* Roxb. ex Willd. (Flacourtiaceae). A small tree found in U.P. hills, eastern and western India and in Assam and adjoining tract. The cherry-size fruit is dark red when ripe, with tarty flavour and is used for making jams, marmalades and preserves.

F. montana Grah. (Flacourtiaceae). An evergreen tree found mainly in the western ghats. The purple cherry-size berries possess acidic taste or tarty flavour.

•*Fragaria nilgerrensis* Sch. Houtbos strawberry (Rosaceae). A creeping herb found in Nilgiris and higher hills of north-eastern India. The fruit is pinkish, sub-acidic and juicy.

•*Garcinia cambogia* Griff. (Guttiferae). An evergreen tree found in north-eastern hills. The yellow ripe plum-size berries possess sour pulp which tastes excellent when sweetened with sugar.

•*G. cowa* Roxb. Cowa (Guttiferae). A tree mainly found in eastern, north-eastern hilly tracts. The orange-red fleshy acidic berries can be made into jams, jellies and preserves. The dry rind is also preserved. The acidic fruits are also consumed raw.

G. hombroniana Pierre (Guttiferae). An evergreen tree found in the coastal region of Nicobar Islands. The fruit is more like mangosteen with peachy flavour and sour taste.

•*G. indica* Choisy, *kokam, cokambil* (Guttiferae). An evergreen tree found in the western ghats. The fleshy ripe purple fruit possesses sweetish to acidic pulp. It is also taken with sugar and water as a drink. The dried pulp is used in curries as a substitute for tamarind particularly in Gujarat and Maharashtra.

G. lanceaefolia Roxb. (Guttiferae). A tree of north-eastern hills. The orange berries possess acidic pulp and are much relished.

•*G. pedunculata* Roxb. (Guttiferae). A tree found in eastern Himalayas and northern hills. The pulpy aril in fruit is like that in mangosteen, highly flavoured and taken with relish.

G. pedunculata Roxb. (Guttiferae). A tree found in north-eastern region. The berries of the size of a small apple are acidic.

G. speciosa Hk.f. Syn. *G. cornifolia* Hk.f. (Guttiferae). A tree found in eastern and western ghats and in north-eastern region. The edible fruit is pale-greenish and pulpy.

G. xalapiana T. And. (Guttiferae). A tree found in the eastern Himalayas. The ripe fruit is edible.

G. tinctoria Dunn. Syn. *G. xanthochymus* Hk.f. Egg tree, *tamala, dampal* (Guttiferae). A tree found in eastern and western peninsula and in Andaman Islands. The fleshy yellow ripe berries with juicy pulp and sub-acidic flavour are made into preserves, jams etc.

Gardenia latifolia Ait. *Papra* (Rubiaceae). A small tree found in dry forests throughout India. The plum-size berries are with edible purplish-coloured pulp.

Garuga pinnata Roxb. *Ghagar, tsem* (Burseraceae). A deciduous tree common in the peninsular tropical region. The fleshy drupes are acidic.

Gaultheria fragrantissima Wall. Fragrant Wintergreen, *gandhras* (Ericaceae). An evergreen shrub found in the Nilgiris, Pulney and Khasi hills. The small black succulent berries possess sweetish pulp.

APPENDIX 5 (CONTINUED)

Entada pursaetha (L.) Merr. Syn. *E. scandens* Benth. Nicker bean, [illegible] Mimosaceae. A large climbing shrub [illegible] and in [illegible] tropical tracts. The large seeds are steeped in water and then roasted and eaten.

Erythrina suberosa [illegible] L. Merr. Coral tree, [illegible] Papilionaceae. A tall tree found in humid tropical tracts of western and eastern ghats, north-eastern [illegible] and in Nicobar and Andaman Islands. The seeds are eaten.

*[illegible] Salisb. [illegible] Nymphaeaceae. An aquatic [illegible] found in [illegible] tracts including [illegible] according to [illegible] in Kashmir [illegible] the [illegible] Madras [illegible] are [illegible] from the [illegible].

Gleditsia triacanthos Park. Locust. [illegible] Caesalpiniaceae. A tree [illegible] in the [illegible] parts of [illegible], west and south [illegible] are eaten.

[illegible] [illegible] Caesalpiniaceae. A [illegible] deciduous tree [illegible] tract. [illegible] The seeds are [illegible].

[illegible] Caesalpiniaceae. A [illegible] The seeds are [illegible].

[illegible] Syn. [illegible] Papilionaceae. A [illegible] found in [illegible] Himalaya. [illegible] The seeds are [illegible].

[illegible] Syn. [illegible] Papilionaceae. A tall [illegible] The seeds are [illegible] in Kashmir.

[illegible] Syn. [illegible] Papilionaceae. A [illegible] herb found in Kashmir [illegible] and seeds are eaten. The [illegible] Himalaya [illegible] *[illegible]* [illegible].

[illegible] [illegible] Papilionaceae. A [illegible] tropical [illegible] and [illegible] as a veg. [illegible].

[illegible] DC. Papilionaceae. A [illegible] tropical tracts of western and eastern [illegible] as a veg. [illegible].

[illegible] DC. Papilionaceae. A [illegible] The seeds are [illegible] and as a [illegible] in [illegible].

**Nelumbo nucifera* Gaertn. Syn. *Nelumbium speciosum* Willd. Lotus, Sacred, [illegible]. Nymphaeaceae. An aquatic herb found all over India. The seeds are eaten and are particularly liked in the north.

Nymphaea stellata Burm. f. Syn. *N. pubescens* Willd. White lotus, [illegible] Nymphaeaceae. An aquatic herb found in ponds throughout India. The seeds are parched and eaten.

N. [illegible] Gerge. Syn. *N. [illegible]* Ait. Pygmy water lily. Nymphaeaceae. An aquatic herb occurring in the Himalayas eastwards to Khasi hills, in ponds and swampy [illegible]. The seeds are eaten.

**Pinus roxburghii* G. Don. [illegible] Pinaceae. A tree confined to north-eastern hills of India. The seeds are eaten after roasting.

P. [illegible] Roxb. Syn. *[illegible]* Roxb. Malabar mountain [illegible] Caesalpiniaceae. A tree mainly found in moist tropical forests of India, common in peninsular region except in drier tracts. The seeds are eaten.

Polygonum glabrum Willd. Polygonaceae. A tall herb common in wet lands all over India. The seeds are made into [illegible] with the fruit pericarp.

**Sterculia guttata* Roxb. *Hort.* Sterculiaceae. A deciduous tree found in western and eastern ghats in peninsular region extending to north-eastern hill tracts. The seeds are eaten roasted. (Fig. [illegible])

**[illegible]* Roxb. Kitchenchem [illegible] Sterculiaceae. A tree widely distributed in tropical and sub-tropical regions. The seeds are roasted and eaten.

S. [illegible] Wall. Sterculiaceae. A tree [illegible] north-west and [illegible] The seeds are [illegible] in the [illegible] of [illegible] species, seeds of [illegible] and [illegible] are also consumed.

Vallaris [illegible] Gaertn. *Pile [illegible]* Roxb. Apocynaceae. A large climber found mainly in the humid tropical zone of western ghats. The seeds are edible.

**[illegible]* Wall. Piperaceae. A tiny herb [illegible] in moist tropical tracts of western and eastern [illegible] and in the sub-Himalayan tracts. The seeds are eaten [illegible] like pulses.

[illegible] Baker. Pteridaceae. A tiny fern found in the hills [illegible] tracts of western and central India extending to [illegible]. The crushed [illegible] are eaten.

Xylia [illegible] Benth. Tulipwood, [illegible] (Mimosaceae). A shrub found in the humid parts of peninsular India and in Andaman Islands. The seed is eaten and [illegible] much like [illegible].

Mainly used as scarcity or famine foods

[illegible] Gaertn. Sweet Sop. [illegible] Annonaceae.

[illegible] (L.) Sweet, [illegible] Malvaceae.

[illegible]

Appendix 6 Some Studies in Two Tribal Groups of Central India: Part 2. Nutritive Importance of Foods Consumed in Two Different Seasons by U. Pingle: Sample Pages

TABLE 4: Tribal foods — wild type

Local name of foods	Kind of food	Scientific name	Tribe (K: Koyas M: Maria Gonds)
Pindi kura	Green leafy vegetable	Aerva lanata Juss	K & M
Tummi kura	Green leafy vegetable	Leucas sp.	K & M
Gunca kura	Green leafy vegetable	Celosia argentea L.	K
Chenchal kura	Green leafy vegetable	Digera arvensis Forsk	K
Doba kura	Green leafy vegetable	Sp. of Araceae	M
Tagerashi kura	Green leafy vegetable	Mixture of Cassia tora L. and Cassia obtusifolia L.	K & M
Nagati sal kura	Green leafy vegetable	Allamania nodiflora R.B.	K
Pedda Doggalli	Green leafy vegetable	Amaranthus gangeticus L.	K & M
Chinna Doggalli	Green leafy vegetable	Amaranthus gracilis Desf.	K & M
Munia Dogalli	Green leafy vegetable	Amaranthus spinosus L.	K & M
Bocia kura	Green leafy vegetable	Argyreia sp.	K & M
Odicillu or Batun	Millet	Echinochloa colona Link.	M & rarely K
Doosa gaddi or Dev Dhan	Rice	Oryza rufipogon Griff.	M & rarely K
Tella senna or Tella gadda	Tuber	Dioscorea hispidia Dennst.	K & M
Nalla senna or Nalla gadda (with bulbils)	Tuber	Dioscorea bulbifera L.	K & M
Nalla senna gadda (without bulbils)	Tuber	Dioscorea esculenta Burk.	K & M
Ellaru gadda	Tuber	Dioscorea sp.	K
Karap gadda	Tuber	Sp. or cucurbitaceae	K
Padmat	Tuber	Dioscorea sp.	M
Pinmat	Tuber	Sp. of Dioscoresceae	M
Kamkalmat	Tuber	Sp. of Dioscoresceae	M
Bubidi gadda	Tuber	Abelmoschus crinitus Wall	M
Kakumat	Tuber	Sp. of Cucurbitaceae	M
Musalamma gadda	Tuber	Asparagus racemosus Willd.	M
Adavi pappu	Tuber	Costus speciosus Sm.	M
Burka gadda	Tuber	Sp. of Bombacaceae	K & M
Sinsu gadda	Tuber	Sp. of Dioscoreaceae	K
Putakoku (growing on ant hill's)	Mushroom	Lepiota sp.	K & M
Kanakoku (growing on dead bamboo)	Mushroom	Agaricus sp.	K & M
Kanka	Bamboo shoots	Bambusa arundinacea Willd.	M
Tuni	Fruits	Diospyros melanoxylon Roxb.	K & M
Ipda or Ipa pulu	Flowers	Bassia latifolia Roxb.	K & M
Adavi Mamidi	Wild mangoes	Mangifera Sp.	M
Adenduka	Fruits	Capparis zeylanica	K
Erra cheemalu	Red ants	Oecophylla Smargadina Fabr.	M
Oturla	Winged white ants	Isoptera	K & M
Adavi elukalu	Field rats		M

APPENDIX 6 (CONTINUED)

Tribal foods of nutritive importance

(i) *Tubers:* They contribute 5–9 per cent of the energy and 7–4 per cent of the protein to the mean intake per C.U. per day of Maria Gonds and Kovas respectively (Tables 2 and 5). This shows that the contribution of energy and protein by tubers in the pre-harvest season to the mean intake of the tribal communities is minimal. These tubers are rich in vitamin C, but since they are boiled thoroughly before eating most of this nutrient would be lost.

A. *Toxic varieties:*

(i) *Dioscorea hispida* Densst. (Telugu – Tella Senna gadda):

These tubers contain the alkaloid dioscorine, saponin and dioscin which are poisonous (Wealth of India, Vol. III).

The tubers are first boiled and then their skins peeled off. They are then cut into thin slices and kept submerged in a flowing stream for about 48 h. The slices are then boiled with chillies and salt and consumed as such or mixed with rice or maize meal. If, in spite of this processing, one feels a bit dizzy after ingestion of a tuber due to the toxic effects, he is given tamarind juice (Tamarindus indica L.) as an antidote. The protein content of these tubers is about 4 per 100 g of edible portion (Table 6). During the lean periods, when the total intake of staple grain is reduced, the adult tribal supplements the energy intake by eating more than 500 g of this tuber per meal.

(ii) *Dioscorea bulbifera* Link (Telugu – Nalla Senna gadda):

The cultigens of these species are grown in the backyards of both Koya and Maria Gonds. The tuber is bitter and acrid, but can be easily rendered edible by keeping in water for 24 h. The tuber is less toxic and has a higher protein content of 5.6 g per 100 g of edible portion than in Dioscorea hispidia. On an average, 800 g of the tuber are eaten per meal by an adult tribal.

B. *Non-toxic tubers:*

(i) *Hibiscus cancellatus* Roxb. (Maria Gondi – Bupudi gadda):

This is a small plant which grows wild in Sironcha. The tuber is conical and is eaten either raw or after boiling. The calcium content of the tuber is high (Table 6) and can be put under the category of calcium rich foods.

(ii) *Bassia latifolia* (Hindi – Mahua, Telugu – Ippa, Maria Gondi – Irpa):

Flowers of this tree are boiled and consumed as food and also made into liquor by these tribals. Though both tribal groups collect Mahua flowers, more of it is consumed by Marias, than by Kovas. The Koyas sell the Mahua flowers before the flowering season at a rate fixed by the money-lender, which is lower than the market price, for the purpose of getting staple grains and other provisions. Mahua flowers in the Maria Gonds (Table 2) contribute 6 per cent calcium to the mean C.U. daily intake in the pre-harvest season. Since they are dried and eaten, most of the vitamin C may be destroyed. On an average, an adult eats 80 g of the flowers per meal.

Wild millets and rice:

(i) *Echinochloa colonum* Link (Telugu – Odipilu, Maria Gondi – Batun):

Seeds of this wild millet are often found in water logged areas, and are collected by swishing a

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TABLE 6: Nutritive Values of Tribal Foods (per 100 gm edible portion)

Local and scientific names of foods	Edible portion %	Moisture gm	Protein gm	Fat gm	Ash gm	Fibre gm	Carbohydrate gm	Energy K J. (k cal)	Calcium mg	Phosphorus mg	Iron mg	Carotene µg	Thiamine mg	Riboflavin mg	Nicotinic acid mg	Vitamin C mg
Shoots and Stems																
Kanka (dried shoots) *Bambusa arundinacea* Willd	100.0	9.8	25.3	3.3	9.3	9.5	42.8	1264 (302)	208	569	12.6	0	–	0.09	3.8	15
Illupa (dried pulp) *Caryota urens*	100.0	6.8	1.1	0.2	1.7	10.9	79.3	1351 (323)	25	21	1.0	–	–	–	–	–
Legumes																
Tavi beans *Abrus precatorius* D G	100.0	6.8	29.1	3.0	2.3	6.4	52.4	1473 (352)	89	442	6.4	0	–	0.4	3.1	16
Green Leaves																
Chinna Doggalli kura *Amaranthus gracilis* Desf	100.0	87.5	3.7	0.6	2.3	0.8	5.1	172 (41)	270	85	1.2	3068	0.08	0.26	1.0	23
Ambali leaves (dried) *Hibiscus sabdariffa* D & G	100.0	6.0	17.8	3.3	6.4	1.4	65.1	1510 (361)	815	190	27.8	503	–	1.1	5.0	11
Tagerashi kura Mix of *Cassia tora* L. and *Cassia obtusifolia* L.	100.0	86.2	3.4	0.7	1.9	1.1	6.7	197 (47)	534	45	5.1	7333	0.17	0.33	1.1	7.8
Bodla kura *Argyreia Sp.*	100.0	83.9	3.5	0.5	1.6	1.7	8.8	226 (54)	167	41	6.2	4108	0.06	0.34	0.8	7
Pedda Doggalli kura *Amaranthus gangeticus* L.	100.0	85.7	4.0	0.6	3.0	0.9	5.8	188 (45)	575	71	10.0	10150	0.10	0.34	1.2	131
Nagthal kura *Allamanda nodiflora* R.B.	100.0	91.6	1.3	0.4	2.0	1.1	3.6	96 (23)	85	41	6.6	2137	0.40	0.12	0.5	3
Pindi kura *Aerva lanata* Juss	100.0	73.1	7.0	0.5	5.8	2.7	10.9	318 (76)	357	57	10.8	10850	0.12	0.44	1.2	36
Tumma kura *Leucas Sp.*	100.0	82.1	4.6	0.6	3.0	1.7	8.0	234 (56)	130	106	11.5	9464	0.11	0.42	1.1	11
Chencal kura *Digera arvensis* Forsk	100.0	71.5	7.8	0.3	6.4	1.2	13.0	360 (86)	495	77	15.2	7519	0.08	0.59	1.3	22
Gunca kura *Celosia argentea* Link	100.0	82.8	5.3	0.3	3.4	1.5	6.7	213 (51)	148	55	7.2	8143	0.11	0.42	1.1	6
Mushroom																
Putakoku *Lepiota Sp.*	100.0	90.4	3.9	–	0.7	–	–	–	4	76	2.2	–	–	–	–	–
Kankakoku (on bamboo) *Agaricus Sp.*	100.0	25.3	26.1	2.3	7.7	6.9	31.7	1053 (252)	52	550	–	0	–	–	–	18
Insects																
Erra cheemalu *Oecophylla smaragdina* Fabr.	100.0	3.9	49.1	–	5.0	–	–	–	294	518	10.8	–	–	–	–	–
Fruits																
Karap tega (fruits) *Cucurbitaceae*	100.0	86.9	1.3	–	0.5	–	–	–	7	41	1.5	–	–	–	–	–

TABLE 6 Nutritive Values of Tribal Foods (per 100 gm edible portion) *continued*

Local and scientific names of foods	Edible portion %	Moisture gm	Protein gm	Fat gm	Ash gm	Fibre gm	Carbohydrate gm	Energy K.J. (k.cal)	Calcium mg	Phosphorus mg	Iron mg	Carotene µg	Thiamine mg	Riboflavin mg	Nicotinic acid mg	Vitamin C mg
(Fruits continued)																
Adonda kaya	100.0	70.7	6.5	–	1.5	–	–	–	30	44	1.2	–	–	–	–	–
Flowers																
Ambah flowers (dried) *Capsra zeylan*	100.0	6.3	5.0	3.9	7.6	2.4	74.8	1481 (354)	1156	27	16.3	0	–	0.09	3.4	17
Tubers & Bulbs																
Bupdi gadda *Abelmoschus crinitus* Wall or *Hibiscus cancellatus* Roxb.	–	66.0	2.1	0.8	3.0	2.4	25.7	494 (118)	322	22	2.0	0	–	0.18	0.22	5
Kakunat gadda *Cucurbitaceae*	–	70.6	2.3	0.1	1.3	0.8	24.9	460 (110)	31	114	2.0	0	–	0.16	0.30	39
Mudumma gadda *Asparagus racemosus* Willd	–	79.3	0.7	0.8	0.7	0.3	18.2	347 (83)	42	7	2.5	0	–	0.04	0.07	17
Kalavpagu *Costus speciosus* Sm.	–	85.7	0.4	0.1	1.1	0.8	11.9	209 (50)	30	17	0.8	0	–	0.07	0.07	1
Padmat gadda I *Dioscoreaceae*	–	82.2	1.8	0.1	0.6	0.9	14.4	276 (66)	37	13	0.1	0	–	0.24	0.21	13
Padmat gadda II *Dioscoreaceae*	–	92.3	0.8	0.1	0.2	0.9	5.7	113 (27)	42	40	0.3	0	–	0.09	0.13	45
Gillimat (bulbils) *Dioscoreaceae*	–	78.3	1.6	0.1	0.9	0.7	18.4	339 (81)	57	26	0.7	1145	–	0.10	0.47	6
Tella senna gadda *Dioscorea hispida* Dennst	92.8	68.6	3.1	0.1	1.2	–	26.0	506 (121)	22	53	2.2	0	0.07	0.05	0.7	161
Halla senna gadda *Dioscorea bulbifera* L.	74.2	66.8	5.6	0.1	1.6	–	26.9	548 (131)	7	76	1.5	0	0.08	0.05	0.6	11
Ellaru gadda *Dioscoreaceae Sp.*	80.8	77.8	1.3	0.04	0.9	–	20.0	356 (85)	10	5	0.6	0	0.04	0.04	0.4	6
Katapi gadda	90.6	70.4	0.6	0.2	1.5	–	27.3	473 (113)	42	6	3.3	–	–	–	–	–

Appendix 7 La Vegetation du Laos by J. Vidal: Sample Pages

ARTICLE III

Jules VIDAL

LA VÉGÉTATION DU LAOS

Tome V, 1re sér. Fol. 1.

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Appendix 8 A Dictionary of the Economic Products of the Malay Peninsula by I. H. Burkill: Sample Pages

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A DICTIONARY OF THE ECONOMIC PRODUCTS OF THE MALAY PENINSULA

BY

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In two volumes, price M$59.00

VOL. I (A–H)

Published on behalf of the

GOVERNMENTS OF MALAYSIA *and* SINGAPORE

by the MINISTRY OF AGRICULTURE AND CO-OPERATIVES, KUALA LUMPUR, MALAYSIA.

1966

APPENDIX S (CONTINUED)

ing at my hart: yet it gave me ease afterward." One wonders which of the various indigestible substances passing as bezoar caused him that restless night.

When a Malay treats his ailments by bezoar he swallows a little material rasped from the stone, fortifying the action of the medicine by wearing a charm (see Gimlette, Mal. Pharmacopœia, 1929, p. [illegible]). He also wears the stone as an amulet and believes it an antidote.

Bezoar becomes a drug in Europe.

About the beginning of the eighteenth century the bezoar-stone began to [illegible] a dispute with European physicians.

In Malaya, Borneo has proved to be the country where the stone is [illegible] most [illegible] and the animal from which it is taken was a monkey of the genus *Semnopithecus*. The porcupine came second. Everett (in Journ. Roy. As. Soc. Straits Branch, [illegible] 1891, p. [illegible]) says that this bezoar from the porcupine is much rarer in Borneo than that from the monkeys of the genus *Semnopithecus*. He says that the demand in India for bezoar-stones had been [illegible] away from those of the monkeys, and that those of the porcupine alone were asked for. These bezoars are bitter and apparently most of them are concretions found in the stomach. Everett mentions that the nucleus of one was the tip of a blowpipe dart.

In the *Medical [illegible] of Malaya*, Med. Gard. Bull. S.S. [illegible] p. [illegible] *Kelupa* (*Jatropha*) is prescribed for convulsions of infancy, and the bezoar from that bezoar from the porcupine may be meant.

Woody herbs.

BIDENS. Linn. A genus of woody herbs, of the family Compositae, found throughout the tropics and into the temperate regions.

B. pilosa. Linn. Ridley, Flora Mal. Penins. 2, 1923, p. [illegible]; Spanish Netbur. *Kuncha* (*Malay*) (*Malacca*), in common with some other Compositae. *Sabong puteh*, *bekek*, *Princess's painted ear-stick*. *Pucuk* [illegible] in common with Ceylon calculation. *Rumput* [illegible] *Kelolen* (in Java). *Ta-ngin*. *Ketul*. *Kelinjau*. *Pucuk Chamman* (Malacca) (in Singapore). *Florida*.

Weed of America.

A herb native of America and now occurring as a weed in [illegible] but not uncommon in the Peninsula.

Malaya.

The Malays use the plant mostly [illegible]. They boil it and take the [illegible] infusion for coughs. As a [illegible] the leaves contain a [illegible] tannin, [illegible] the astringent action is [illegible] good. The Malays run the leaves [illegible] in the [illegible] and in the *Pharmacopœia* [illegible] 3, 1[illegible] [illegible] that they use the flowers [illegible] of [illegible] and [illegible]. The [illegible] statement was on [illegible] authority.

Malaya and Java.

The people of Java and China apply a [illegible] of the leaves steadily for toothache (Crevost and Petelot in Bull. Econ. Indochine, 1924, p. [illegible]). But in Java, it is said, they use the root as well as the young leaves and stems. The roots are used in Pahang in a way which has [illegible] authority. In the *Medical [illegible] of Malaya* [illegible] Med. Gard. Bull. S.S. [illegible] p. 4[illegible] the juice is prescribed in a draught for [illegible] a [illegible] eaten poison.

Eyesight.

[illegible] the leaves with alum and strained the juice into the eyes. It is recorded that, in Java, the juice [illegible] of the

leaves, along with a little lime-juice and perhaps water, is similarly applied, or a cold infusion of the root is dropped into the eyes for dimness of vision. Again, the juice of the leaves is used, in Indo-China, for eye-complaints. Crevost and Petelot say that this is general.

In Java the leaves, heated, are applied to boils to open them.

For boils.

It had a place at one time in the Dutch Colonial Pharmacopœia, but that was by the error of confusing it with *Coleus amboinicus* (K. Heure, Nutt. Plant. Ned. Ind., ed. of 1927, p. 144).

The [illegible] may be cooked and eaten in Java. The flowers, it is said, are mixed, by the Igorots of the Philippines, into the balls of boiled rice which they set to ferment in the manufacture of a crude spirit (Gibbs and Agcaoili in Philipp. Journ. Sci. A-7, 1912, p. [illegible]). W. H. Brown (Bull. 22, Bur. For. Philipp. 2, p. 376) transfers this information to the extremely similar and generally confused species *B. chinensis*, Willd.

Food.

Used as an [illegible] in spirits, or in *B. chinensis*.

Crusius has quoted an opinion (Bull. Jamaica Dep. Agric. 1, 1933, p. 24n) that *B. chinensis* has slightly purgative properties; others seem to corroborate this (see Agric. News, [illegible] p. [illegible]).

The leaves are said to be a substitute for tea in Mexico.

Substitute for tea.

It is apparently a fair fodder, and, at any rate, is readily eaten.

Fodder.

BIGNONIA. Linn. A genus of woody climbers of the family Bignoniaceae, found in America. *B. unguis-cati*, Linn., and the former [illegible] of it known as *B. [illegible]*, Linn., are cultivated in Malaya. *B. sequinctialis*, Miers, which also is cultivated, has been referred to the genus *Cydista*.

Ornamental climbers.

BIJEH. The Malay term for a concentrate of tin-ore or other heavy mineral such as ilmenite or wolfram, which, because they will not [illegible] tin, are qualified as unfit, see Amang. [J. B. S.]

BIOPHYTUM. DC. A small genus of herbs, with a woody stem, of the family Oxalidaceae, found almost throughout the tropics. They are of curious appearance, so that Rumpf [illegible] *B. [illegible]*, DC., to a man at the coconut-palm. It has a tiny trunk, and the numerous pinnate leaves are arranged like the leaves of a coconut-palm. These leaflets are very sensitive to a touch, and fall from the horizontal on being touched. It would be strange if the simple minds of tropical villagers did not connect its striking characteristics with a need of their own, and use it in some way. The sensitive leaves suggest, to the people of the East, modesty; therefore they argue that the plant may restore a virtue it has been lost; no doubt the will to use it supplies the real factor in the remedy (see Rumpf, Herb. Amboin. 5, 1750, p. 3[illegible]). By an extension of the argument, among the people of Ternate, the herb is taken for prolonged product, that is, youth. Acosta mentions it as a love-philtre, in western India. That the medical uses given below are related to these occult uses, has yet to be investigated.

Herbs with occult uses.

APPENDIX 8 (CONTINUED)

CORCHORUS—(2) capsularis

increase of the output can be got from Finlow's writings (see Trans 3rd Internat Congr Trop Agric 1, 1915 p 518).

Vegetable — In Bengal it is a very common thing to add a few leaves of the plant to the daily diet of rice, as it is considered to be a tonic. Slaves from India, who were detained in Amboina in Rumph's time, made so much use of it as a vegetable that he calls it 'jayor bengesia' or Bengal vegetable. Farmer it is considered valuable enough in Bengal for a crop of leaves to be dried and sold, and when there is any disorder of the liver a tea is made from them and drunk. The active substance is a glucoside, to which it is referred. (Indo Rep Ind Drugs Committee 3, 1930 p 331) that it is undoubtedly a valuable gastric tonic.

Medicinal uses have spread to the Malays, who encourage an odd plant here and there in their villages, calling it jantu, which is of origin from the Bengali name jhuti-ta, and indicates how the Malays acquired a knowledge of it. They use it as a decoction from the leaves for dysentery, and as a tonic for children, for coughs, and in poisons. Sometimes they use it for poisoning wives.

Chemistry — Capsulin is the glucoside present in the leaves (Journ Chem Soc 1922 p [illegible]). Corchorin—another glucoside—has been extracted from the seeds. It is [illegible] acting on the heart, like digitalis (see Kobert, Lehrb. d. Intoxikationen, 2, 1906 p 1222).

De Perulia (Rivista Agricoltura, 17, 1924 p 334) claims to have found a trace of hydrocyanic acid in the bark.

Raffinose is present in the seed. The seed can be found in the Chinese pharmacies of Malaya (Hooper in Gard Bull S S 9, 1929 p 42).

3. **C. olitorius**, Linn., is mentioned in Ridley's *Flora* (1, 1922 p 305) as an occasional weed in the Malay Peninsula, and he quotes a specimen, but the specimen is *C. capsularis*. Yet *C. olitorius* was been found at Batu Pahat in Johore. Experimentally, grown in the Botanic Garden, Singapore, it lived but a short time, branching so prematurely that, as far as can be seen, the production of jute here from it in Malaya is out of the question. A similar conclusion was arrived at when it was tried in Java (K. Heyne, Nutt. Plant. Ned. Ind. ed. of 1927 p 1038), where it flowered prematurely when less than two months old and only a foot high. It occurs wild sporadically in Java.

Climate makes it unsuitable as a fibre crop

Vegetable. — In the Levant it is an important vegetable, particularly in Egypt, where it is called 'melokhia'. This use has been brought into Java. For eating, in Egypt, it is allowed to grow for 2–3 months, then the tops are cut, a new cutting follows when the plants have grown again, and may be followed by more cuttings. Crevost and Lemarié mention that in Indo-China it is possible to get a cutting off the plants a month from sowing (Cat. Prod. Indochine, [illegible] 1915). In Egypt the plants of the spring crop, after two or three cuttings, are allowed to seed. For the rice crop in Bengal plants for 7–8 months, which are only from twenty and 5–6 feet or

CORCHORUS—(3) olitorius

more high, it is cut. In spring it is common to pull shoots from the fields and use them with rice as a vegetable.

The use of 'melokhia' as a vegetable is ancient in the Levant; Theophrastus and Pliny mention it. It is interesting that its use should be so much more extensive in the Levant than in any other part of the world, but it is used widely, and this seems to account for its occurrence in China, Malaya, and some parts of America.

Crevost and Lemarié (Cat. Prod. Indochine, 1917 p 416) mention the leaves as a possible forage. — Fodder.

An animal-poisoning principle is present in the seeds (Kobert, Lehrb. d. Intoxikationen, 2, 1906 p 1222).

CORDIA, Linn. A large genus of trees and shrubs of the family Boraginaceae, found throughout the other parts of the world. — Various parts with various uses. Timber

The timber of some species is excellent. *C. gerascanthus*, Linn., for instance, gives one of the best timbers of Jamaica. Some Indian species give valuable wood, and the Malayan *C. subcordata* gives wood excellent for certain purposes. *C. fragrantissima*, Kurz, yields a very pleasantly smelling wood used in Burma for face-powder.

The berries of several species are sweet and edible. — Food

C. myxa, Linn., is the lubestan of Egypt, and of ancient cultivation. At the present day its mucilaginous fruits are used for coughs. — Medicinal.

1. **C. dichotoma**, Forst. f. (*C. obliqua*, Willd.; Ridley, Flora Mal Penins. 2, 1923 p 434; *C. myxa*, Roxb., and of many writers upon Eastern Asia, not of Linnaeus; *Sekendul*, *Sekendul*, *Pitekan* in Java, *Ar-tut* in Sumatra, *Nanang* in Siam, *Pan-nan*).

A tree of about 50 feet, found from northern India and southern China to Australia and Polynesia; in the Peninsula it seems to be wild in the northern parts, but in the southern parts, to be planted only.

Branches cut and put into the ground, root easily, and so in Java it is used as garden stakes (K. Heyne, Nutt. Plant. Ned. Ind. ed. of 1927 p 1397). Twigs are woven into fish-traps in the Philippine Islands. — Stakes.

The fruits are very mucilaginous and give a glue. K. Heyne says that the oil covered is lost after a time. — Glue.

A decoction of the bark is said to be good for dyspepsia, and to be a febrifuge; the powdered bark is applied to ulcers in the mouth (Gunters in Bull. 22, Bur. For. Philipp. 3, 1921 p 227). Crevost and Lemarié (Bull. Econ. Indochine, 22, 1920 p. 40) state that in Indo-China the bark is medicinal, but they do not say in what way. K. Heyne gives it as used for dysentery in Java along with pomegranate rind, and for fever. — Medicinal.

The bark may be made into cordage, but it is weak when dry and still weaker when wet. The Malays seem never to use it. Formerly, in India it was used for making the faces of old-fashioned native [illegible] and for making boats (Watt, Dict. Econ. Prod. India, 2, 1889 p 931) gives experiments upon the tensile strength of ropes. The [illegible] of leaves of tea with string made from it. — Cordage. Fibre. Cooking. Boats.

The timber is tough, fairly strong, and seasons well, but insects soon attack it. It is used in India for boat-building, well-curbs, agri- — Timber.

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APPENDIX 8 (CONTINUED)

worthy and Woolley, Mal. For. Rec. 8, 1930 p. 14). It is somewhat brittle so that it cannot be cut into a veneer. Foxworthy (Mal. For. Rec. 1, 1921 p. 93) calls it common, but not abundant, and describes it as moderately heavy, coarse-grained, red to dark red, with the heart-wood very distinct from the sap-wood, the latter sometimes very abundant. It has a distinct odour. He gives as its uses wooden shoes, temporary construction and light furniture. Foxworthy (in Bull. 1, B.N. Borneo Dep. For. 1916 p. 26) says that the wood of the Durios, of which several forms are recognized in Borneo, produced presumably by different species, can be used in lieu of the poorer grades of Seraya (*Shorea*).

Skeat and Blagden (Pagan Races, 2, 1906 p. 586) give as equivalent words for 'durian daun', 'shanggel' among the Sakai of the Serau, and 'ngel' in Tembe.

Several of the species called 'durian daun' produce their fruits at the base of the trunk, where they are accessible to animals who seek them and distribute the seeds through the forest. The fruit of the others, the same animals seek after their fall to the ground. It is known that many animals eat durian fruits.

1. **D. macrophyllus**, Ridl.; Ridley, Flora Mal. Penins. 1, 1922 p. 264. *Durian daun, Durian tanah* (earth durian), *Durian api*.

A big tree found in the Malay Peninsula from Penang to Malacca.

Timber. The fruits are formed at the base of the trunk, as the name 'durian tanah' indicates. Its timber makes part of that used as 'durian daun'.

2. **D. malaccensis**, Planch.; Ridley, Flora Mal. Penins. 1, 1922 p. 262. *Durian api, Durian hutan, Kunyit Sahan*.

A big tree found in the Malay Peninsula from Perak to Johore.

Timber. Its timber makes part of that used as 'durian daun'.

3. **D. oxleyanus**, Griff.; Ridley, Flora Mal. Penins. 1, 1922 p. 263. *Durian daun, Durian hutan, Kurupal* (name needs confirmation).

A tree found in the Malay Peninsula in Malacca and Pahang; also in Sumatra.

Timber. Ridley (Agric. Bull. Straits and F.M.S. 1, 1901 p. 48) describes the timber as like that of *D. zibethinus*, but of closer texture.

Juice of bark, and seeds medicinal. K. Heyne (Nutt. Plant. Ned. Ind. ed. of 1927 p. 1050) says that in Sumatra juice from the bark is taken for malaria, and that raspings of the seeds are applied to ulcerations and wounds.

Antiscorbic. The mucilage and is edible.

4. **D. pinangianus**, Ridl.; Ridley, Flora Mal. Penins. 1, 1922 p. 264; *D. testudinarum*, var. *pinangianus*, Becc. *Durian burong* (bird's durian).

A big tree found in the Malay Peninsula, in Penang and near Ipoh in Perak.

Timber, for masts. Low (Soil and Agric. Penang, 1836 p. 201) said that the timber of 'durian burong' was useful for masts, and gave the weight and breaking strain of it. McNair (in Cantley's For. Rep. for 1883, appendix) said that the 'durian burong' reached 120 feet in height, and made excellent masts and spars, but was only scarce. These

remarks recall Rumpf's statement that the wood of the true durian was used in the Moluccas for masts.

Ridley says that the pink flesh on the seeds is tasteless.

5. **D. singaporensis**, Ridl.; Ridley, Flora Mal. Penins. 1, 1922 p. 263.

This would be the tree indicated by Cantley (For. Rep. for 1883 p. 16) as on the road to extinction in Singapore. He calls it 'durian burong' and *D. oxleyanus*. No doubt it was once common in the island and its timber would then be sought. Timber.

6. **D. wrayi**, King; Ridley, Flora Mal. Penins. 1, 1922 p. 264. *Durian burong, Durian daun*.

A large tree found in the Malay Peninsula in Kedah, Perak, and Selangor, but perhaps only a form of *D. pinangianus*. Its timber is probably identical. Timber.

7. **D. zibethinus**, Linn.; Ridley, Flora Mal. Penins. 1, 1922 p. 261. *Durian, Pendok, Penak, Penek daun, Pendok sengkuit* (these four in Semang), *Hampak* (in Semang), *Shempa*, or *Sempa* (in Sakai), *Pele diyan* (in Besisi), *Tuang* (in Jakun); in Java, *Duren, Ambétan*; in Sundanese, *Kudu*; in Sumatra, *Durian, Duian, Dérian*; in Siam, *Turian*.

A big tree, but fruiting already at seven years, probably a native of Borneo (Beccari, Malesia, 3, 1889 p. 231), extended in cultivation right through Malaysia, but not to New Guinea, nor to Burma proper, though found throughout Tenasserim. Had it been possible to extend its cultivation into Burma the Burmese kings would have done it long ago; but they were forced to content themselves by getting a supply of fruit to Ava from beyond Moulmein, organizing a service of runners for the purpose. Fruit-tree.

In the last century the tree has been taken by European agency to other parts of the tropics, before which time, the natives of Malaysia had taken it as far as they could—its seeds not possessing such vitality as would enable them by their primitive methods to carry them to any distance or pass them on to others. The fruit itself does not keep, and should be eaten within two days of its fall from the tree.

It is most exceptional for a durian-tree not to be raised from seed, though budding is possible: and it is rare for the owner of a tree to know what the mother-tree of his own tree was like. But a superior durian-tree soon gains a reputation in its neighbourhood and its fruits are sought, carried short, or even considerable distances, and the seeds are thrown out in new places with some chance of propagating their kind. By such indirect selection some betterment in the general level of the fruit is produced. In parts of the Dutch Indies, where agriculture is most advanced, connoisseurs will claim to recognize a number of races. A list of twenty was published in Buitenzorg in 1866; but in the last work that has come from Buitenzorg, Ochse (Fruits Dutch East Ind. 1931 p. 29) says that in the villages the offspring is, for the most part, dissimilar to the parent and it would be useless to endeavour to discuss the different types. Races.

Appendix 9 Vegetables of the Dutch East Indies. Edible Tubers, Bulbs, Rhizomes and Spices Included. Survey of the Indigenous and Foreign Plants Serving as Pot-Herbs and Side-Dishes by J. J. Ochse and R. C. B. Van Den Brink: Sample Pages

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DEPARTMENT OF AGRICULTURE, INDUSTRY AND COMMERCE OF THE NETHERLANDS EAST INDIES

VEGETABLES OF THE DUTCH EAST INDIES

(EDIBLE TUBERS, BULBS, RHIZOMES AND SPICES INCLUDED)

SURVEY

OF THE INDIGENOUS AND FOREIGN PLANTS SERVING AS POT-HERBS AND SIDE-DISHES

BY

J. J. OCHSE

IN COLLABORATION WITH

R. C. BAKHUIZEN VAN DEN BRINK

ENGLISH EDITION OF INDISCHE GROENTEN

MARTINUS NIJHOFF — THE HAGUE
SOLE AGENT FOR CONTINENTAL EUROPE 1935

APPENDIX 9 (CONTINUED)

abnormality that a few or all stamens have been replaced by ovaries, so that instead of 1 ovary and 5 stamens, as is normal, 2-6 ovaries are found in the flowers (Cf. J. C. Costerus and J. J. Smith, Studies in Tropical Teratology, in Ann. Jard. Bot. Buitenz., 2nd serie, VIII (1909), p. 12, plate III, under the name *T. antheria phlogeroides*, (Mart.) Miq.). Other characteristics are: Stems fistular with 2 hairy grooves; leaves glabrous, ovovate-lanceolate; base narrowed, apex acute or obtuse; peduncles with one hairy longitudinal groove, otherwise glabrous.

Literature. Koorders: Exkflora von Java, II (1912), p. 200; Koorders: Atlas Exkflora, part 3, 2 (1926), p. 615, fig. 921.

Amaranthus Blitum, L.

(Fig. 11)

FAM. Amaranthaceae.

Dutch: *Kleine majer.*
English: *Amaranthus*, Wild Blite.
Malay: *Bayém cetik, Bayém monjet.*
Jav.: *Bayém lémpo, Bayém cetik, Bayém lémah, Bayém ménir, Bayém sapi.*
Sund.: *Bayém hanjem, Bayém letok, Bayém lémah, Bayém tie hanjem, Bayém tie letok, Bayém tie sapi, Djempirak, Sémanung, Sémanung cetik, Sémanung monjet.*
Mad.: *Bluc ém, Tarnex lélek, Tarujak lélek.*

Annual, decumbent or ascending, less often erect, internal weed, usually much branched from the base, 5-25 cm. high, taproot strong, far penetrating into the soil, branches terete or slightly ridged, glabrous, yellowish green or more or less tinged with purple. Leaves most variable as to shape and dimensions, alternate, long petiolate, ovate, ovoid-rhomboid, lanceolate, acute, cuneate or obtuse, apex broadly narrowed, obtuse or [illegible], entire, [illegible], almost entire, [illegible], on both surfaces glabrous and dull or [illegible], bluish-pale green or on the upper side more or less tinged with purple or violet-brown, in the nerves beneath studded with pale dots, 0.50 cm. long, 0.2 cm. [illegible] whole light or dark purple shining, densely dotted, slender, those of the upper leaves 1.5 cm. long. Flowers clustered, unisexual-monoecious, small, sessile, light green or purple, the lower clusters axillary, the higher ones in a dense spike or panicle; bracts and bracteoles much smaller than the perianth; sepals 3, ovato-lanceolate, obtuse, shortly acuminate, both bronze green or reddish brown centre and white scarious margins; stamens in the male flowers and styles in the female flowers 3. Fruit ovoid compressed, longer than the perianth, indehiscent, [illegible] with [illegible] along lines on brown.

This plant is found in a wild state throughout the Dutch East Indies; in Java it occurs from the plains up to ± 200 m. alone seaboard in sunny or slightly shadowy localities, for instance waste places, dunghills and between the paved of sidewalks and garden walks. It varies extremely with climate and with character of the soil.

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APPENDIX 9 (CONTINUED)

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polyantha, Wight	536.	330.
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Appendix [illegible] The Food Plants of the Philippines by P. J. Wester: Sample Pages

INDEX TO PART I, BY SPECIES

[illegible] Okra
[illegible]
[illegible] Cabbage
[illegible] Algae.
[illegible] Algae
[illegible] L. Shallot.
[illegible]
[illegible] L. Leek
[illegible]
[illegible] L. Cowpea
[illegible] Orm
[illegible] Sorghum.
[illegible]
[illegible] Celery
[illegible] L. Peanut
[illegible] Kyong.
[illegible] L. Asparagus
[illegible] Pace.
[illegible] Bamboo
[illegible]
[illegible] Bamboo.
[illegible]
[illegible] Cocoa
[illegible] Root
[illegible] L. Rutabaga.
[illegible] Mustard.
[illegible] L. Cabbage
[illegible] DC. Kale
[illegible] DC. Cauliflower.
[illegible] Hort. Kohlrabi.
[illegible] Hort. Brussels sprouts.
[illegible]
[illegible] L. Turnip
[illegible]
[illegible] DC. Turnip-rooted
[illegible] L. [illegible]
[illegible] L. Carrot
[illegible]
[illegible] Bentl. et Hook. Parsley

[illegible] Tratt. [illegible]
[illegible] Algae
[illegible]
[illegible]
[illegible]
[illegible] L. [illegible]
[illegible]
[illegible] Capsicum annuum
[illegible] Capsicum frutescens
[illegible] L. [illegible]
[illegible] Dasi
[illegible] L. Cucumber
Cucurbita moschata Duch. Squash.
Cucurbita pepo DC. Pumpkin
[illegible] L. Turmeric.
[illegible] DC. Gourd
[illegible] Scott. Palisan.
[illegible] L. Cassava
[illegible] Bamboo
[illegible] L. Tarro.
[illegible] L. [illegible]
[illegible]
[illegible] Papaya.
[illegible]
[illegible] L. Banana
[illegible] L. Apayao.
[illegible] L. Algae
[illegible] Algae.
[illegible] Tugal.

[illegible] Bamboo
[illegible] Soya
[illegible] Algae.
[illegible] Algae
[illegible] Algae.
[illegible] Algae
[illegible] Harv. Algae
[illegible] L. Lettuce.
[illegible] Ulo
[illegible] Cassava.
[illegible] Cabalo.
[illegible] Cabalo
[illegible] Cabalo
[illegible] Harv. Algae
[illegible] Rox. Patola
[illegible] Rox. Patola.
[illegible] Cabalo.
[illegible] Mill. Tomato
[illegible] Pohl. Cassava.
[illegible] L. Arooro

[illegible] L. Mint.
[illegible] Lotus. Sago palm.
[illegible] L. Apium.
[illegible] Lam. Malabayo.
[illegible] W. & A. Lyon bean.
[illegible] Willd. Lotus.
[illegible] Warmb. Nipa.
[illegible] L. Rice.
[illegible] Urb. Sincamas
[illegible] Cabalo.
[illegible] L. Parsnip
[illegible] Rox. Sango
[illegible] Angay
[illegible] L. [illegible]
[illegible] Willd. Scarlet runner.
[illegible] DC. Bean.
[illegible] L. Pea.
[illegible] DC. Sequoia
[illegible] L. Bayon
[illegible] L. Bluemo
[illegible] L. Sugar cane
[illegible] Algae.
[illegible] Merr. Dolo.
[illegible] Hayata. Bamboo.
[illegible] L. Sesame
[illegible] L. [illegible]
[illegible] Banana
[illegible] Nutt. [illegible]
[illegible] L. Tamarind.
[illegible] L. Potato
[illegible] Forst. Yabia
[illegible] (L.) Tulinum.
[illegible] Sprengel, New Zealand.
[illegible] L. Salifay.
[illegible] L. Pacopsi
[illegible] Cabalo
[illegible] Sibo
[illegible] Cabalo
[illegible] Scopoli. Vaotia.
[illegible] L. [illegible]

APPENDIX 10 (CONTINUED)

INDEX TO PART [illegible] BY SPECIES

[illegible]

Coffea canephora Coffee-Uganda.

[illegible]

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APPENDIX 10 (CONTINUED)

Gnetum latifolium Bl. Gnitat.
Grewia asiatica L. Phalsa.
Grewia edulis Merr. Balisco.
Grewia stylocarpa Warb. Malinig.
Hibiscus sabdariffa L. Roselle.
Ilex paraguariensis St. Hil. Maté.
Inocarpus edulis Forst. Kayam.
Lansium domesticum Jack. Lanzón.
Lansium domesticum Jack. var. *duku*. Duku.
Lansium dubium Merr. Mamáta.
Litchi chinensis Sonn. Litchi.
Lucuma nemorosa Gaertn. Chico-mamey.
Lucuma rivicoa var. *angustifolia* Mart. Tiesa.
Macadamia ternifolia Muell. Damia.
Malpighia glabra L. Malpi.
Mammea americana L. Mamey.
Mangifera altissima Blanco. Paho.
Mangifera caesia Jack. Binjai.
Mangifera foetida Lour. Bachang.
Mangifera indica L. Mango.
Mangifera odorata Griff. Jatni.
Mangifera verticillata C. B. R. Bajino.
Mangifera sp. Kaulik.
Manilkara dulcisima Lesbin. Ciriman.
Morus alba L. Mulberry.
Musa paradisiaca L. Banana.
Nephelium lappaceum L. Rambután.
Nephelium malayense Griff. Kuching.
Nephelium mutabile Bl. Balitia.
Pouteria philippense C. B. R. Alacao.
Pouteria edulis Reinw. Tanzi.
Pouteria edulis Sims. Lillisi.
Pouteria lucifolia L. Parcha.
Passiflora quadrangularis L. Granadilla.
Persea gratissima Mill. Peruasia.
Persea americana Mill. Avocado.
Phoenix dactylifera L. Date.
Phyllanthus emblica L. Neli.
Physalis peruviana L. Physalis.
Piper nigrum L. Pepper.
Pithecolobium dulce Benth. Camanchile.
Prunus persica Sieb. et Zucc. Peach.
Psidium cattleianum Sabine. Cattley.
Psidium friedrichsthalianum Nds. Cas.
Psidium guajava L. Guava.
Psidium guineense Sw. Araca.
Psidium luridum Berg. Tuarisa.
Psidium malli Bertol. Guavaro.
Punica granatum L. Pomegranate.
Pyrus malus L. Apple.
Rhodomyrtus Planch. et Triana. Bella.
Rollinia emarginata Seemann. Mirim.
Rollinia orthopetala A. DC. Biriba.
Rollinia sp. Pinho.
Rubus coreanus Merr. Copela.
Rubus eliptica Sm. Tilao.
Rubus elmeri Focke. Tilao.
Rubus fraxinifolius Poir. Palanda.
Rubus moluccanus L. Kinabo.
Rubus niveus Thunb. Pilay.
Rubus pectinellus Max. Atibu.
Rubus rolfei Vid. Balfeim.
Rubus rosaefolius Sm. Bugini.
Sandoricum koetjape Merr. Santol.
Sandoricum radinum King. Kechapi.
Sapindaceae. Agláño.
Sarcocephalus esculentus Afzel. Céfalus.
Sauravia bontocensis Merr. Dúguay.
Semecarpus cuneiformis Blanco. Camiring.
Semecarpus gigantifolia F. Vill. Manalú.
Sideroxylon mastichodendron Jacq. Mastic.
Spondias cytherea Sonn. Hevi.
Spondias lutea L. Membin.
Spondias pinnata Kurz. Lanno.
Spondias purpurea L. Ciruela.
Sterculia foetida L. Dungur.
Sterculia oblongata R. Br. Panglo.
Sterculiaceae. Tulu.
Tamarindus indica L. Tamarind.
Terminalia edulis Blanco. Dalinsi.
Tetramerista hermanii Planch. Ayo.
Theobroma cacao L. Cacao.
Triphasia trifolia P. Wils. Limoncito.
Ulmus sp. Banaúac.
Ulmus zovangorensis Presl. Aliga.
Urceolus vidalii Vid. Alemani.
Urceolus whitfordii Merr. Calmo.
Vangueria manipuscarensis J. F. Gmel. Vuavanga.
Vanilla planifolia Ans. Vanilla.
Vitex cotundifolia Miers. Tempe-musendire.
Vitis vinifera L. Grape-vinifera.
Zalacca edulis Reinw. Salak.
Zingiber officinale L. Ginger.
Zizyphus jujuba L. Jujube.

Appendix 11 Wild Food Plants of the Philippines by W. H. Brown: Sample Pages

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Wild Food Plants of the Philippines

By William H. Brown, Ph. D.

Chief, Division of Investigation, Bureau of Forestry, Professor of Botany, University of the Philippines, and Plant Physiologist, Bureau of Science

Department of Agriculture and Natural Resources
Bureau of Forestry

Bulletin No. 21

Arthur F. Fischer, Director of Forestry

MANILA
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1929

52113

APPENDIX 11 (CONTINUED)

small, greenish, with a disagreeable odor, and occur in considerable numbers on compound flowering shoots.

This species is known from only one specimen which was found growing wild on what is now the campus of the College of Agriculture at Los Baños, Laguna.

Genus NEPHELIUM

NEPHELIUM LAPPACEUM L. (Fig. 55). USAU or RAMBUTAN.

Local name: *Usau* (Jolo).

The pulp of the fruit has an excellent flavor.

Nephelium lappaceum is a tree. The leaves are smooth, pointed at the tip, and somewhat rounded at the base. The flowers are very numerous on compound inflorescences. In the Philippines, this species is found only in Palawan and Jolo. It is the well known Rambutan of the Malay region.

NEPHELIUM MUTABILE Blanco. (Fig. 56). BULALA.

Local names: *Alpai* (Laguna); *Sulalan* (Pangasinan); *Sumalipes* (Lanao); *Sualo* (Camarines, Tayabas, Laguna, Rizal); *Salwo-lalwo* (Sorigao); *Sawa* (Mindoro); *Ingom* (Tayabas); *Sulampalan* (Samar); *Sumalip* (Cagayan); *Janayan* (Rizal).

The fruits are red, about 4 centimeters in length, and completely covered with numerous, rather soft projections. The flesh is white, abundant, juicy, and of very good flavor. It surrounds a single, rather large seed.

Nephelium mutabile is a tree reaching a height of about 25 meters and a diameter of 45 centimeters. The leaves are alternate and compound with rather large, smooth, alternate leaflets, which are pointed at both ends. The flowers are small, and occur in considerable numbers on simple or compound inflorescences.

This species is distributed from northern Luzon to southern Mindanao and is very common in Luzon.

Family VITACEAE

Genus AMPELOCISSUS

AMPELOCISSUS MARTINI Planch.

The fruits of this species are borne in grape-like clusters, are somewhat less than a centimeter in diameter, greenish salmon in color, fleshy, acid, and of fairly good flavor.

Ampelocissus martini is a large woody vine with conspicuous tendrils. The leaves are somewhat hairy, three-lobed, with toothed margins, and a russet, velvety lower surface. The

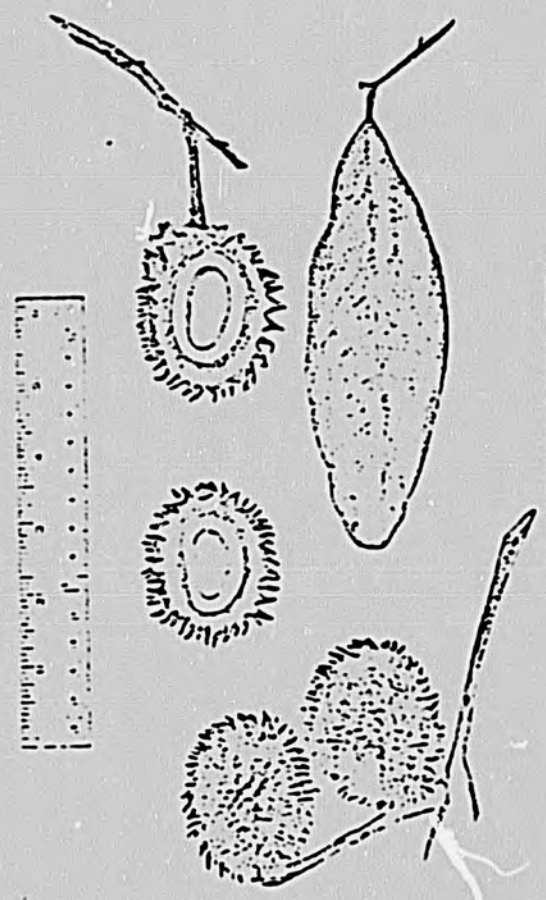

FIGURE 56. NEPHELIUM MUTABILE (BULALA).

APPENDIX 11 (CONTINUED)

Genus MIMUSOPS

MIMUSOPS PARVIFOLIA R. Br. (Fig. 78). BANSALAGIN.

Local names: *Banselagin* (Tayabas, Masbate, Palawan, Mindoro, Cavite, Batangas, Camarines, Union, Tawao Island, Bataan, Cotabato, Zamboanga); *bansalagin* (Siboyan, Masbate, Negros); *[illegible]* (Nueva Ecija); *[illegible]* (Ilocos Sur); *[illegible]* (Zamboanga); *[illegible]* (Cagayan, Palaui Island); *[illegible]* (Cagayan); *[illegible]* (Nueva Ecija, Tarlac, Pampanga); *[illegible]* (Bulacan); *[illegible]* (Bulacan).

The fruit is oval, about 3 centimeters long, and reddish or yellowish. It has a firm outer covering, and contains a single seed surrounded by a fleshy, aromatic, edible pulp.

Mimusops parvifolia is a tree reaching a height of about 25 meters and a diameter of about 90 centimeters. The leaves are alternate, smooth, pointed at both ends, and from 4 to 10 centimeters in length. The flowers are rather small, white, and fragrant. The inner bark is red and contains a sticky, milky sap.

This species is very common and widely distributed in the forests from northern Luzon to the southern limits of the Archipelago. It is rarely cultivated.

Genus PALAQUIUM

PALAQUIUM PHILIPPENSE C. B. Rob. (Fig. 79). MALAKMILAK.

Local names: *Ayas, [illegible]* (Mindoro); *[illegible]* (Cavite, Rizal, Batangas, Laguna, Bataan, Tayabas, Mindoro, Pampanga); *[illegible]* (Ilocos); *[illegible]* (Cagayan); *[illegible]* (Bataan); *[illegible]* (Tayabas); *[illegible]* (Zambales); *[illegible]* (Pampanga); *[illegible]* (Cagayan); *[illegible]* (Albay); *[illegible]* (Bataan, Pangasinan, Pampanga, Bulacan, Tarlac, Zambales).

The fruit is oval, about 3 or 4 centimeters or more in length, contains a single seed, and is edible.

Palaquium philippense is a tree reaching a height of about 25 meters and a diameter of about 80 centimeters. The leaves are usually 10 centimeters or more in length. The lower surfaces are very striking, being velvety and russet colored. The flowers are about 1.5 centimeters in length, and are borne on long stalks in small clusters. The corolla is white, the calyx brown and velvety.

This species is very common and widely distributed from northern Luzon to southern Mindanao. It is cultivated only at the Lamao Experiment Station.

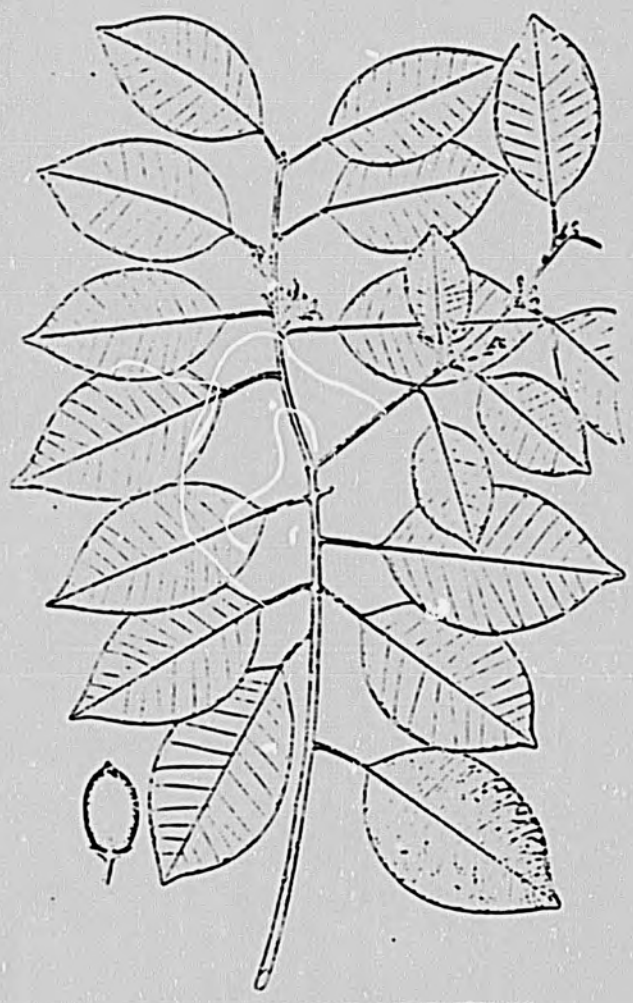

FIGURE 78. MIMUSOPS PARVIFOLIA (BANSALAGIN). ×½.

Appendix 12 Edible Wild Plants in Philippine Forests by M. R. Monsalud, A. L. Tongacan, F. R. Lopez, and M. Q. Lagrimas: Sample Pages

Annotated list of edible wild plants of Philippine forests—*Continued.*

Local and scientific names and family	Edible part	Method of preparation and consumption	Brief notes
7. [illegible] (L.) Jussieu]	Leaves, stems and seeds	Cooked and eaten in India.	An ascending or prostrate [illegible], green or [illegible] pubescent [illegible]. Stems 0.2 to 0.5 meters long, simple or branched. Leaves alternate, petiolate, elliptic to orbicular, obtuse and 1 to 2.5 cm long. Spikes numerous, white, axillary, solitary or crowded in the axils, denser flowered and 1 cm long or less. Flowers green and white and about 2 mm in diameter. Common in open dry waste places at low and medium altitudes in regions subject to a pronounced dry season throughout the country.
8. Kulitis (*Amaranthus viridis* L.)	Young leaves and stems	Cooked and eaten as vegetables.	An erect, smooth, branched, thornless annual, about 30 to 60 cm in height. Leaves broad at base with narrow apex and usually notched. Inflorescences occur in axils of leaves or at ends of branches. Seeds small, either brown or black. Common in open waste places in the Philippines.
9. Bagatagadi (*Achyranthes aspera* L.)	Tender leaves and seeds	Cooked and eaten in India.	A coarse, rambling or erect, distantly branched, annual herb about 0.5 to 2 meters high. Leaves oblanceolate, about 5 to 15 cm long, acuminate, more or less pubescent or nearly glabrous. Spikes rigid, elongated and about 10 to 30 cm long. Flowers green and about 3 mm long. Found throughout the Philippines at low and medium altitudes. Occurs as a weed in open waste places and certainly introduced.
10. Urapula (*Amaranthus tricolor* L.)	Young leaves and stems	Cooked and eaten as vegetables.	A coarse, smooth, annual, herbaceous plant about 1 meter or more in height. Leaves dull purplish. In some varieties the top leaves are pale yellow to bright red. Occurs from northern Luzon to Mindanao. Occasionally grows wild in waste places.
AMARYLLIDACEAE 11. Tolcadei (*Curculigo orchioides* Gaertn.)	Tubers	Cooked and eaten in India.	A small herb with grassy leaves. Flowers yellow, small which blow just above the ground. Found in open grassland, particularly in region areas at low and medium altitudes. Distributed from Luzon to Palawan and Mindanao.
ANNONACEAE 12. Lusin (*Parkinsonia corymbosa* (Blume) Miq.)	Fruits	Sweet fleshy portion eaten raw.	A large tree with grayish bark, thick [illegible] branches. Leaves papery, [illegible] smooth, [illegible] at base and acute. Flowers crowded. Fruits obovoid to [illegible] long, 7 cm long and about one half as [illegible]. Widely distributed in the low forested regions throughout the Philippines.

APPENDIX 12 (CONTINUED)

Annotated list of [illegible] plants of Philippine forest—*Continued.*

[illegible]	[illegible] part	[illegible]	[illegible]
27. Sisangkalabau (*[illegible]* Blanco)	Fruits	Eaten raw or cooked as vegetables. Good flavor.	A climbing shrub. Younger parts densely hairy. Leaves alternate, hairy, pointed at tip and [illegible] at base, [illegible] from 5 to 16 cm in length. Fruits borne in rounded clusters, oval, or kidney-shaped, hairy, and red. Contain two rows of flat, semicircular seeds. Occurs from central Luzon to southern Mindanao in thickets and forests at low altitudes. Sometimes cultivated.
28. Ulasak (*[illegible]* Presl)	Fruits	Eaten raw.	A large woody vine with large leaves. Flowers yellow and borne in rounded clusters. Fruits oblong, semikidney-shaped, salmon yellow and aromatic.
APOCYNACEAE (Alstonia or Iata family)			Common and widely distributed from northern Luzon to Basilan.
29. Girim [*Ochrosia oppositifolia* (Lam.) K. Schum.]	Seeds	Eaten raw or cooked.	A small tree. Leaves [illegible] thick, pointed at the base, and abruptly pointed at tip. Found only in Mindanao and Basilan. Occurs in forests along the seashores.
30. Labusei [*Excoecaria lucida* (Merr.) Merrill]	Seeds	Eaten raw or cooked.	A small tree. Leaves occur in whorls of three or four, smooth and pointed at both ends. Flowers yellow and have a slender and cylindrical corolla-tube. Found throughout the Philippines.
ARACEAE (Arum or gabi family)			
31. Biga [*[illegible]* (L.) Schott]	Stems and corms	Eaten after roasting or boiling. Heating helps in driving away or destroying the harmful substances.	A [illegible] plant. Leaves and petioles contain minute, stinging crystals. Leaves large, arrow-shaped and with a rather large trunk. Widely distributed in the Islands in open, wet lands along streams and some types of humid forests.
32. Halitli (*[illegible]* Schott)	Young leaves	Cooked and eaten as vegetables.	An herb about 1 meter high with large leaves and with large white flowers. Occurs from Luzon to Mindanao.
33. Kapa (*[illegible]* L.)	Young leaves	Cooked and eaten as vegetables.	Occurs in great abundance on surface of stagnant water and slowly moving streams. Leaves massed in rosette, which gives the plant an appearance and color like that of ordinary lettuce. For this reason, it is called water lettuce. Common and widely distributed at low and medium altitudes in the Philippines.
34. Lebuan (*[illegible]* L.)	Rhizomes	Powdered and used as condiment.	An herb with stout, branched, aromatic rhizomes. Leaves flat, several 25 to 50 cm long, and 1 to 1.5 cm wide. Stems erect, much elongated, and sometimes close to leaves. Spathe 3 to 8 cm long. Flowers [illegible] and have [illegible] flower. Found throughout the Islands as a cultivated plant, at [illegible] found growing wild in marshes in great abundance. Apparently introduced into the Philippines.

APPENDIX 12 (CONTINUED)

Annotated list of edible wild plants of Philippine forests—*Continued.*

Local and scientific names and family	Edible part	Food preparation, [illegible] and palatability	Brief notes
BIGNONIACEÆ (Bignonia or tui family)			
41. Pinuka-pinukahan [*Oroxylon indicum* (L.) Vent.]	Immature fruits	Cooked and eaten as vegetables.	A small glabrous, sparingly branched tree. Leaves opposite, 3 or 1 pinnate; leaflets numerous and pointed at tip. Corolla is dark purple and bell-shaped. Fruit is a capsule. Seeds including very thin wings up to 6 cm wide. Common and widely distributed from northern Luzon to Basilan in thickets and secondary forests at low and medium altitudes.
42. Tui (*Dolichandrone spathacea* Fenzl. ex Seem.)	Young flowers and fruits	Cooked and eaten in Borneo.	A moderately-sized glabrous deciduous tree about 5 to 15 meters high. Leaves opposite, coriaceous, ovately oblong. Racemes terminal, short, few flowered. Flowers white or yellowish tinged borne upon 2 to 3 cm long spathelike fleshy spike. Capsule as long as leaves, slightly compressed, pointed and usually curved. Seeds numerous and winged. Found chiefly along coasts or in marshy interior districts throughout the country.
BLECHNACEÆ			
43. Diliman [*Stenochlæna palustris* (Burm. f.) Bedd.]	Young shoots	Eaten either raw as salad or cooked.	A coarse, climbing fern of indefinite length. Stems brown, smooth, somewhat less than 1 cm in diameter and sparingly branched. Sterile fronds up to 80 cm in length and pinnate; fertile fronds somewhat shorter than sterile ones. Widely distributed in thickets, usually in swampy places near the sea.
BOMBACACEÆ			
44. Durian (*Durio zibethinus* Murr.)	Fruits and seeds	The aril around the seed is highly relished. Unripe fruit have an insipid, watery taste. The seeds are cooked, dried and fried; it is said, however, that they contain poisonous substance, which makes one short of breath.	A large, buttressed tree. Bark dark redbrown, touch, peeling off irregularly. Leaves alternate, chartaceous, elliptical or lanceolate elliptical, about 10 to 15 cm long and 3 to 5 cm wide, shortly acuminate, base acutish or obtuse; upper surface glabrous, glossy, midrib sunken; lower surface densely covered with minute silvery or goldlike scales. Inflorescences on older branches forming fascicles of corymbs of 3 to 50 flowers with a main peduncle of up to 5 cm; branches once to three times. Fruits green yellow, globose, up to 25 cm long and 20 cm in diameter with broadly pyramidal sharp spines. Seeds completely covered with a white or yellowish soft, very sweet aril. Fruits drop unopened. Occurs from Davao to Batanes and central Mindanao.
45. Malabulak [*Salmalia malabarica* (DC) Schott and Endl.]	Buds, young pods and roots of seedlings.	Cooked and eaten in India.	A very large tree which becomes leafless in the dry season. Trunk covered with large pyramidal spines. Leaves palmately compound with 5 to 7 leaflets, smooth, oval pointed at both ends, and about 10 to 20 cm long. Flowers 3

APPENDIX 12 (CONTINUED)

Annotated list of edible wild plants of Philippine forests—*Continued.*

Local and scientific names and family	Edible part	Food preparation, [illegible] and palatability	Brief notes
69. Tabog-ok [*Momordica cochinchinensis* (Lour.) Spreng.]	Young leafy shoots and fruits.	Cooked and eaten as vegetables. Fleshy portion of fruit is eaten raw.	A coarse vine reaching a length of 15 meters and climbing by means of tendrils. Slightly hairy or nearly smooth. Leaves 6 to 15 cm long, deeply three-lobed or sometimes entire and base heart-shaped. Petals pale and from 2.5 to 4 cm long. Fruits ovoid, somewhat rounded, yellow and roughened with scattered tubercle-like spines. Occurs from northern Luzon to southern Mindanao.
CYCADACEAE (Cycas or pitogo family)			
70. Pitogo [*Cycas circinalis* L. subsp. *rumphiana* (Porte) Schust.]	Young rolled leaves and ripe seeds.	Leaves are cooked and eaten. Ripe seeds are crushed and soaked in several changes of water to remove the poisonous substances and dried. The flourlike product is cooked into small cakes or as porridge.	A palmlike tree with stout stem reaching a height of 12 meters and 100 cm in diameter or smaller. Leaves pinnate and produced in a cluster at top of trunk. Of local occurrence and generally found near the seashore; sometimes planted for ornamental. In times of famine, the ripe seeds are prepared as food in some isolated parts of the country. In India, a kind of sago is prepared from the trunk. It is widely distributed in the Philippines.
CYPERACEAE (Sedge or balangot family)			
71. Apalid [*Eleocharis dulcis* (Burm. f.) Trin.]	Tubers	Cooked and eaten as vegetables.	A tufted sedge with round, green stems. Bases covered with brown sheaths. Stem about a meter high and 1 cm in diameter. Bracts of spikes rounded, smooth, and overlapping. Of local occurrence and found in open wet places and shallow water throughout the Islands.
72. Tiaiu (*Scirpus grossus* L. f.)	Roots	Cooked and eaten in India.	One of the coarsest sedges with triangular stems up to 2 meters high. Large inflorescences subtended by broad leaflike bracts up to 60 cm in length. A dominant in open swamps at low altitudes, and widely distributed in the country.
CYATHEACEAE			
73. ——— (Cyathea spp.)	Leaves	Cooked and eaten as vegetables.	A tree fern which bears huge pinnately compound fronds arranged in a crown at top of stout erect trunk, bearing small scaly bract, and sometimes also hairs. Abundant in many parts of the Philippines, although rarely found at low altitudes except in regions where there is abundant rainfall.
DAVALLIACEAE			
74. Aniloalo [*Nephrolepis biserrata* (Forsk.) Presl]	Young shoots	Cooked and eaten as vegetables.	A terrestrial fern with creeping rhizomes. Stem erect, producing a tuft of fronds. Narrow pinnate fronds from [illegible] to [illegible] meters long and [illegible] to [illegible] cm wide. The plant grows well on the ground and as an epiphyte. Widely distributed in low and medium altitudes in the country.

Appendix 13 Plants With Edible Fruits in the Philippines by C. B. Tadeo: Sample Pages

*Alagadisso	*Anona spinescens* Mart. (ANONACEAE)	A spiny and ungainly shrub. A native of Brazil, it has been reported from Lanao and Bataan in 1920. It grows up to 3.5 meters high. The leaves are small, roundish to oblong, and leathery. The fruits are 7 cm. long, heartshaped, tuberculate, and bright orange in color. The fleshy pulp is sweetened to make it edible.
*Amoras or Mulberry	*Morus alba* L. (MORACEAE)	A moderate-sized plant, which is widely distributed and cultivated in the Philippines. The leaves are reddish or yellowish brown. The bark is smooth except with the presence of some long horizontal lenticels. The fruit is dark purple or nearly black when ripe, fleshy, and 1.5 to 3 cm. long. A freshing drink can be made from its juice as well as jam from its fruit.
*Ampalaya or Amargoso	*Momordica charantia* L. (CUCURBITACEAE)	An herbaceous annual vine which climbs by tendrils, grows in thickets and backyards throughout the Philippines. It is extensively cultivated. The fruit is oblong cylindrical, pointed at both ends, ribbed and wrinkled. Both fruits and young leaves are boiled and eaten with meat and other vegetables.
Anahau	*Livistonia rotundifolia* (Lam.) Mart. var. *Luzonensis* Becc. (PALMAE)	A widely distributed palm which grows naturally in forested areas. The young fruits are edible when made into sweets or mixed in "halo-halo" or milk-shake.
Anibong	*Oncosperma filamentosum* Blume (PALMAE)	A tall slender palm which grows subgregariously in favorable habitats, in ravines and in lowlands bordering mangrove swamps. The fruits are sometimes used as substitute for areca nuts commonly preferred in "Buyo" chewing.
Anonang	*Cordia dichotoma* Forst. (Bor.) (EHRETIACEAE)	It is found in secondary forest and thickets. It is a deciduous tree which grows to about 10 meters. The fruit is yellowish-white or pinkish, ovoid, and with sweet and edible scanty pulp.
Api-api	*Avicennia officinalis* L. (VERBENACEAE)	A mangrove swamp species which grows to about 5 meters tall. The fruit is ovoid and contains a single seed in a capsule 2.5 to 4 meters long. Both fruits and seeds are edible.
*Bael	*Aegle marmelos* Corr. (RUTACEAE)	A deciduous small tree introduced into the Philippines. It has straight spines. The fruits are small with orange-colored, sweet, thick, aromatic and edible gelatinous pulp. The best preparation is marmalade which is

APPENDIX 13 (CONTINUED)

Buñga de China or Oring-oring	*Adonidia merrillii* Becc. (PALMAE)	A palm almost resembling the betel palm, but it is not so tall. Its leaves are strongly arched. The fruits are sometimes used as substitute for the betel nut for chewing.
Buri or Silag	*Corypha elata* Roxb. (PALMAE)	The largest and most stately member of the palm family. The young fruits are made into sweets.
Basain	*Bruguiera gymnorrhiza* (L.) Lam. (RHIZOPHORACEAE)	An erect tree that grows in mangrove swamps. The thick-ridged, very dark to almost black bark contains many large, brown corky postules. After two boilings the fruit is eaten in coconut milk. The whole fruit is first boiled and the outer part scraped away during the second boiling.
Boyokbuyok or Tabogok	*Momordica cochinchinensis* (Lour.) Spreng. (CUCURBITACEAE)	A course vine, reaching 15 meters, climbs by means of tendrils. The young leafy shoots are cooked as vegetables. The edible seeds contain sweet oil which is obtained after compression.
•Cacao	*Theobroma cacao* L. (STERCULIACEAE)	A small tree scattered and cultivated in low and medium altitudes. It is cultivated for its seeds which are used in the manufacturing of chocolate, cacao butter, etc. The pulp of the young fruit can be eaten raw.
•Calabasa or Squash	*Cucurbita maxima* Duchne (CUCURBITACEAE)	A coarse herbaceous vine cultivated in the Philippines. The flesh of the yellow squash is largely used as a vegetable. It can be baked, boiled, and stewed. It is an excellent substitute for pumpkin in making pies.
•Carandas	*Carissa carandas* L. (APOCYNACEAE)	This large thorny shrub is a native of India. The green fruits make good pickles and the ripe ones may be eaten or made into jelly.
•Canistel or Toesa	*Lucuma nervosa* A. DC. (SAPOTACEAE)	The species is a native of West Indies and introduced to the Philippines from America. The edible flesh of the fruit is yellow, dry, sweet and aromatic.
Cayenne pepper or Larang-baiia	*Capsicum frutescens* L. var *longum* (D.C.) Bailey (SOLANACEAE	An annual herb which is widely distributed in the Philippines. It is about 40 cm. tall and with angled branches. The fruits long, bright red and pungent are used for seasoning.
•Champeden or Tsempedak	*Artocarpus integer* (Thumb.) Merr. (MORACEAE)	A tree introduced into the Philippines. The thick rind of the fruit is juicy and turns black when ripe. The young or mature fruits is boiled and eaten as vegetables.
Champoi	*Myrica rubra* S. & Z. (MYRICACEAE)	An evergreen tree, reportedly found in the mountains of Zambales and Palawan. The fruit which is sub-acid, is eaten both the raw and cooked conditions.

APPENDIX 13 (CONTINUED)

Mamoko	*Hedyachras philippinensis* (SAPINDACEAE)	A tree about 15 meters tall. It is cultivated in the College of Agriculture, College, Laguna. The peach-like fruit is about 5 to 6 cm. in diameter. It is yellow, fleshy, and sub-acidic, slightly astringent. Edible.
Melon or Katimon	*Cucumis melo* L. (CUCURBITACEAE)	A crawling vine that is grown in the Philippines. The fleshy fruit is eaten with sugar.
*Mirim	*Rollinia emarginata* Schlechtd. (ANONACEAE)	A slender native shrub or small tree of Brazil and Paraguay and introduced into the Philippines. The flesh of the custard apple-like fruit is edible.
Monggo or Balatong	*Phaseolus aureus* Roxb. (LEGUMINOSAE)	An erect annual herb cultivated throughout the Philippines. The linear pods contain seeds which are extensively eaten as a viand after they are boiled and stewed. Also, an excellent soup can be prepared from them.
Miao or Halon	*Morinda umbellata* L. (RUBIACEAE)	A large diffuse shrub found in thickets and forests at low altitude. The fruits are eaten with curries while green, or eaten uncooked when ripe.
Okra or Gumbo	*Abelmoschus esculentus* (L.) Moench (MALVACEAE)	An erect herb widely cultivated. The fruit is an elongated capsule. The immature ones are succulent and eaten in various forms.
Pagatpat	*Sonneratia alba* J. Sm. (SONNERATIACEAE)	A mangrove species found mostly in the outer part of mangrove swamps and in exposed reefs. The ripe fruits have a cheese-like taste and is eaten raw or cooked.
Pakuan or Water melon	*Citrullus vulgaris* Schrad. (CUCURBITACEAE)	A native vine of tropical Africa now widely cultivated in temperate and tropical countries. The fruits are edible.
Pañgunigan or Tallowwood	*Ximenia americana* L. (OLACACEAE)	A spiny shrub about 3 meters tall. The fruits taste like sour apples but are eaten fresh or pickled. Cooked nuts in powder form are mixed with Sago to make bread.
Piañga	*Madhuca obovatifolia* Merr. (SAPOTACEAE)	Reported only from Camarines. This tree grows about 20 meters high. The fruit resembles like that of chico but twice as large and rough. Edible.
Palasan	*Calamus maximus* Blanco (PALMAE)	A sylvan palm found in the virgin forest at low and medium altitudes but is occasionally found in the second growth forest. The gelatinous pulp surrounding the seeds are edible.
Patalsik	*Descaspermum fruticosum* Forst. (MYRTACEAE)	A small tree found in thickets located from sea level to an altitudes of 2,000 meters. The round fruit when ripe turns red. The black berries are sweet and eaten.
*Papaya	*Carica papaya* L. (CARICACEAE)	Sometimes called "mellow tree", it is widely cultivated. The large fruit is ob-

APPENDIX 13 (CONTINUED)

Pugahan or fish-tailed palm	*Caryota cumingii* Lodd. (PALMAE)	A palm widely distributed in the Philippines. The mature seeds are used as substitute for the areca nut for chewing with buyo leaves.
Putat	*Barringtonia racemosa* (L.) Blume (LECYTHIDACEAE)	A small tree found throughout the Philippines in open lowlands and in thickets near the seashore and along streams. The fruits are pounded to allow the starch to settle. Without stirring the sediments, the liquor is pour-off gently. The starch produced is made into cakes.
Pinit	*Rubus copelandii* Merr. (ROSACEAE)	A scrambling shrub that grows in Benguet. The orange-colored berries are nearly 2 cm. in diameter. They are fairly juicy and eaten but not well-flavored.
Red pepper or Sili	*Capsicum frutescens* (Annum) L. (SOLANACEAE)	A shrub-like herb found occasionally in waste places in the Philippines. The red fruit is oblong and 1.5 to 2.5 cm. long. It is pungent and extensively used as a condiment.
Sagisi	*Heterosphathe elata* Scheff. (PALMAE)	A tall slender palm with pinnate leaves 3 to 4 meters long. The numerous, small and globous fruits are in stalks. The ripe ones are sometimes chewed as a substitute for areca nuts.
Raspberry	*Rubus rosaefolius* Sm. (ROSACEAE)	A spiny spreading shrub found in thickets and forests at low altitudes. The red conically-elongated juicy fruits are eaten both raw or cooked.
*Sea grape	*Coccoloba uvifera* L. (POLYGONACEAE)	A native tree of tropical America and recently introduced into the Philippines. The small fruits which have sweetish-acidic taste are eaten.
Serpent or Snake gourd	*Trichosantes anguina* L. (CUCURBITACEAE)	A slender vine found to a limited extent, at low and median altitudes. The leaves are circular in outline. Like other gourds, the fruit is eaten in the immature stage.
Sesame or Lalga	*Sesamum indicum* L. (PEDELIACEAE)	An erect annual herb. The seeds of the black variety are utilized for making cakes.
Sierra leone peach	*Nauclea esculenta* (Afzel. Merr. (RUBIACEAE)	A vigorous climbing shrub introduced into the Philippines. The leaves are opposite and elliptical. The pulp of the fruit is edible.
*Soncoya	*Anona purpurea* Moc. and Sesse (ANONACEAE)	A native tree of Central America which is introduced into the Philippines. The aromatic fruits which are much larger than the custard apple have good flavor.

Appendix 14 Philippine Mushrooms by J. M. Mendoza: Sample Pages

THE PHILIPPINE JOURNAL OF SCIENCE

VOL. 65 JANUARY-FEBRUARY, 1938 NOS. 1-2

PHILIPPINE MUSHROOMS

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SEVENTY-NINE PLATES AND FIVE TEXT FIGURES

INTRODUCTION

The mushroom from time immemorial has been considered one of the delicacies of the table. According to classic literature, Roman aristocrats prepared their own mushroom dishes, and in eating them used only amber knives and silver service. The following epigram shows the esteem in which the mushroom was held among the Romans as food: "Gold and silver and dresses may be trusted to a messenger but not boleti." History tells us that a fungus called "Caesar's mushroom" (*Amanita caesarea*), said to be one of the most delicious, was seasoned by his wife, Agripina, herself, for the last meal of the Roman Emperor Claudius. The Chinese have long been known to be very fond of the mushroom. It is present in practically all their dishes. Mushroom culture among the Chinese has been known for centuries, and dried mushrooms have been brought from China to the Philippines in large quantities.

In the Philippines mushrooms are becoming popular as an article of diet. Interest in mushrooms as food is shown by the number of people who collect them wild for the table, and by the increasing number of inquiries received at the Bureau of Science. Unfortunately lack of familiarity with the different types of mushrooms has given rise to cases of mushroom poisoning in Manila and in the provinces. This work has, therefore, been prepared in response to inquiries received

APPENDIX 14 (CONTINUED)

In England it is considered edible. Its edibility in the Philippines has not yet been tested.

LEPIOTA HISPIDA Lasch. Not tested. Plate 18, fig. 1.

A beautiful mushroom growing on rotten logs in very cold places in the forests. It appears in groups, often united at the base, from May to December. The edibility of this mushroom has not yet been tested.

The cap is nearly convex, plain, umbonate, 2.5 to 4.5 centimeters in diameter, scaly, chestnut-brown to dark brown. The scales are blunt, stiff, soon becoming shaggy and especially dense at the center of the cap. The gills are white and free at the sides towards the stem. The stem is cylindrical, more or less swollen at the base, of the same color as the cap, 4 to 8 centimeters long and 3 to 5 millimeters in diameter, scaly, but the scales are rare. The ring is broad, shaggy, pale, rosy above and brown below. The bulb is evanescent. The flesh is white, tasteless, with a typical mushroom odor. The spores in mass are white.

LEPIOTA SILACEA Berkeley. Kabutong [illegible]. Tagalog. Not tested. Plate 18, fig. 2.

Like *Lepiota sepiaestris*, this is a conspicuous tent mushroom, found early in May or even late in February. It is cosmopolitan in habit, growing in very rich soil consisting of decayed vegetable matter, in the lowlands in the forests and in the very heart of the city under acacia trees. In appearance it resembles *L. cerodes*, but it is much smaller, and the cap is round and striated and later the margin is torn. Also, *L. silacea* grows singly or in groups of very few, while *L. cerodes* grows in tufts of many. Only by very careful study of the characters of the two fungi can the beginner distinguish one from the other. The varied color gives this mushroom an attractive appearance. Its edibility has not yet been tested. Its small size, however, makes it not very inviting to the collector of mushrooms for the table.

The cap is 2.5 to 3.5 centimeters in diameter, fleshy, convex-campanulate, plain to depressed, sometimes umbonate, at first of a purple-lilac color, then colorless and covered with dry, beautiful, dark scales. The gills are white, free, somewhat crowded, but far rounded toward the stem; the edge of the gills is threadly. The stem is equal in diameter throughout, hollow, fibrous, white to flesh-lilac toward the top, becoming darker downward, 2.5 to

* Lilac mushroom.

4 centimeters long, 2 to 3 millimeters in diameter. The annulus is membranous, persistent, white above, dark violet below. This mushroom is odorless and tasteless.

The Tagalog name is derived from the color of the fungus.

LEPIOTA METULISPORA Berkeley and Broomeella. Not tested. Plate 19, fig. 1.

This mushroom is quite common in Manila during the rainy season, from June to September. It grows singly, on the ground under shade trees, generally under acacias. Its edibility in the Philippines has not yet been determined.

The cap is fleshy, top-shaped when young, becoming bell-shaped when expanded, covered with yellowish to very pale straw except at the center, 3 to 5.5 centimeters in diameter. The gills are white, somewhat crowded, round and free toward the stem. The stem is equal throughout, 4 to 9 centimeters long, 5 to 7 millimeters in diameter, hollow, and white, yellowish to very pale below the ring; the rest is pale. The ring is cottony, easily evanescent. The flesh is white. This fungus has a typical mushroom odor and a mild taste.

LEPIOTA sp. Kabutong [illegible]* (Tagalog). Not tested. Plate 19, fig. 2.

The cap when young is nearly round to egg-shaped, then bell-shaped, later expanded, 5 to 10 centimeters in diameter with a slight angular elevation on top, covered with grayish brown to reddish-brown skin which later breaks up into shaggy scales except on the top where it remains intact. The stem is 7 to 12 centimeters long, and 4 to 7 millimeters in diameter, cylindrical, tapering upward, enlarged at the base, of the same color as the cap. When injured, it becomes pinkish to almost reddish, a characteristic found also in *Lepiota americana*. The ring is movable and membranous.

This mushroom grows singly, scattered, or in groups of very few, on the ground, often on sandy soil under acacia trees along the road. It is quite common in Manila, most abundant during the months of heavy rains, and can be found from May to October. Its edibility has not yet been tested.

LEPIOTA RENUNDATA Schroeter. Kabutong [illegible]* (Tagalog). Poisonous. Plate 21.

The cap is globose to conical when young, becoming bell-shaped to broadly expanded, thin, fleshy, 4 to 7 centimeters in diameter, sulphur yellow throughout, sometimes the center is nearly orange-colored, covered with fine, cottony scales which disappear in age; the margin is deeply striated, especially in age. The

* Umbrellalike mushroom. * Sulphur-colored mushroom.

Appendix 15 Composition of Philippine Foods: Sample Pages from Intengan et al 1953; Intengan et al. 1954; and Intengan et al 1955

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fruit weighed 4 to 10 grams. It is a rather expensive fruit and most often used only in making ice cream.

POMELO (*Sinta*).—The sample obtained from Paco market was, according to the vendor, harvested from Pangasinan. The fruits were round, green with yellowish patches; and the skin was almost smooth. The sampling was made from three medium ripe fruits.

SAPODILLA (*Tsiko*).—This is a seasonal fruit varying in size and shape. The skin is russet-brown and slightly tough, it has a sweet brown juicy pulp which may be granular or smooth in texture. The fruit has six glossy black seeds radially imbedded in the pulp. Sapodilla is eaten fresh only and becomes highly flavored when ripe. Twelve fruits were used in sampling with sizes varying from 2 to 5 cm and were obtained by the Paco market vendor from Batangas.

II. LEAFY VEGETABLES

MALABAR NIGHTSHADE (*Alugbati*).—The green and purple varieties of this climbing vine are widely cultivated. The young leaves and stems make a good substitute for spinach. The slimy quality of the cooking juices is not as pronounced as in *talinum*. The sample was brought to the laboratory from a private garden in Manila.

TARO LEAVES (*Dahon ng gabi*).—The use of taro leaves in the Filipino diet is regional in popularity. The plant is grown primarily for its tubers. The fleshy stem is also eaten. The sample used was taken from Malibay, Pasay. The leaves are dark green and extremely large, varying in size from 30 × 15 to 30 × 60 cm. The leaves are usually dried in the shade for about two days prior to cooking. The leaves for analysis were prepared in this manner.

SWEET TOPS (*Talinum triangulare*).—The sample consisted of young tender leaves and stems gathered from Calauan, Laguna. These are usually served sauteed with other vegetables.

Kangkong (*Ipomoea*).—The young tops of this herbaceous vine having somewhat heart-shaped leaves are edible but not commonly used. Young leaves obtained from the U.P. site, Diliman, Quezon City, were used in preparing the samples for analysis.

SWAMP CABBAGE (*Kangkong*).—This is a herbaceous creeping vine growing in swampy land. It is not cultivated but widely distributed and can be found daily on the market stalls. The young tender leaves and stems make a delectable green either

as salad (steamed), sauteed or with soups. The sample analyzed was purchased from Cabuyao market where it was sold in bundles. Each stem contained 4 to 8 leaves.

Kulasuda.—This is a common weed found at medium altitude and low areas. The leaves which are edible but very rarely used are pinnate with 6 leaflets. Those of the sample measured from 6 to 12 cm in length.

CHINESE CELERY (*Kintsay*).—A dark green perennial herb with a distinctive taste. The leaves and tender stalks are eaten cooked in soup, sauteed or used for garnishing. Plants of sample (*a*) measured from 20 to 38 cm with the roots. They were gathered from Malibay, Pasay City. Sample (*b*) averaged 23 cm and was grown in Parañaque, Rizal. Samples for analysis were prepared from the young leaves and tender stalks.

Kulasuda.—This is a perennial herb commonly used for borders in flower gardens. In some areas of the Philippines, *Kulasuda* is reported to be used for food. The tops of the green variety were used for sampling.

Lowang sugot.—This plant is widely used as a hedge. The leaves are thick, light green to yellowish green, and the veins are clearly traced by a light shade of yellow. The flowers, borne in erect racemes, are small, white with purplish color at the base. This plant is reportedly used for food in certain areas of the Philippines. The sample analyzed consisted of tops gathered from the campus of the University of the Philippines, Diliman, Quezon City.

Kutsay.—These are long, flat, slender, narrow leaves which taper to a point. The leaves are very dark green in color, measure from 23 to 43 cm in length and have an odor similar to onions. It is popularly used for garnishing.

LETTUCE (*Letsugas*).—The leaves are extensively used in making salad and for garnishing Filipino dishes. The plant is available almost any time of the year. Leaves of sample (*a*) measured from 13 to 33 cm and were gathered from Malibay, Pasay City. Sample (*b*) came from Baguio and the leaves were much larger, especially in width. There were 8 to 10 leaves to a plant. Sample (*c*) consisted of fully matured leaves from Parañaque, Rizal. About a kilogram of each sample was used in preparing the slurry.

MUSTARD (*Mustasa*).—This is a widely cultivated vegetable, popular and inexpensive. The plants sampled were gathered from Malibay, Pasay City. The dark green leaves measured from 18 to 38 cm long and 8 to 13 cm wide.

BEST AVAILABLE COPY

APPENDIX 15 (CONTINUED)

Sasung Kalabaw.—The fruits were purchased at Pasay City market and came in clusters. The fruit is smooth, ellipsoid and about 2.5 cm long. The skin is orange-red in color and encloses 5 to 15 black seeds with very little acidic pulp.

CANISTEL (*Tayos*).—These are orange-colored fruits, ovoid in shape, strongly aromatic in flavor, and thin-skinned. The pulp, which is also orange in color, has the consistency of boiled sweet potato. The fruit has one large dark-brown seed.

PONDEROSA (*Talibonglong*).—The sample came from a private backyard in San Juan, Rizal. Ponderosa was first introduced into the Philippines around 1915 and fruited for the first time about 18 years later. Fruits range in weight from 100 to 500 gm. The pulp is reddish brown, juicy, and delicious when properly ripened.

2. VEGETABLE LEAVES

FRAGRANT PREMNA (*Alagaw*).—These are the leaves of a small tree. Only the young leaves were used in preparing the sample. The leaves are ovate, somewhat heart-shaped at the base and pointed at the tip. Its use as a vegetable is not very common; it is more popular as a medicinal plant.

BITTERMELON TOPS (*Ampalaya*).—The young and tender leaves of this climbing vine were sampled in (*a*). The leaves purchased from Pasay City market were rounded, lobed, heart-shaped at the base and measured 4 to 9 cm in diameter. Sample (*b*) came in cut vines about half a meter long but only the young leaves were sampled. The leaves measured 4 to 7 cm wide.

Alitagtag.—This sample came from Calauan, Nueva Ecija. The leaves are ovate, 2.5 to 4 cm wide, broad at the base and pointed at tip. The young leaves and tender stems were used.

GARLIC LEAVES (*Bawang*).—The plant is a low herb 30 to 60 cm high. The bulb measured 1 to 2.5 cm; stem, 15 to 20 cm; and leaves, 35 to 42 cm. The leaves are linear and flat and vary in number from 4 to 6 on each stem. The whole plant without the roots was used in preparing the sample for analysis.

Dampalit.—This plant grows along river banks and near the seashore. The leaves are narrow, about 0.25 to 0.5 cm wide and 3 to 4 cm long, are fleshy and almost cylindrical. They are often used as vegetable with "sampalong" and are especially delicious when pickled. The leaves sampled were gathered from the brackish water of Obando, Bulacan.

TARO LEAVES (*Dahon ng gabi*).—Analyzed sample of large taro leaves has been reported in the first paper. Sample reported here are smaller leaves having an average measure of 15 by 18 cm. The leaves were allowed to wilt overnight prior to sampling.

SEAWEED (*Gulamang-dagat*).—This is a long, slender, filamentous green alga which is usually used for making salad. The seaweed was purchased at Blumentritt market.

Hinlabian.—The young leaves were used in sampling.

NEW ZEALAND SPINACH (*Alapinakang Daguio*).—This has become popular as a food plant rather recently. The leaves vary from 2 to 12 cm in length. The edible portion consists of the new growth including tender leaves and stems. The whole plant averages about half a meter long.

SQUASH TOPS (*Talbos ng kalabasa*).—The leaves of this vine are coarse, about 8 cm in diameter, rounded but heart-shaped at the base, shallowly 5-lobed and very finely toothed at the margins. This vine has long tendrils 22 to 35 cm long which were also included in the preparation of the sample.

SWEET POTATO TOPS (*Talbos ng kamote*).—This is one of the commonest edible, inexpensive, and useful leafy vegetables in the Philippines. The leaves are pointed at the tip and heart-shaped at the base. The leaves sampled had an average measure of 5.5 by 6 cm. Sample (*a*) was submitted by the Bureau of Plant Industry, while sample (*b*) was bought from the market. The color varies from green to purple. The young leaves are steamed and used as a salad, in soups, as a vegetable cooked with meat, fish, or shrimps, or seasoned with "bagoong."

CASSAVA LEAVES (*Kamoteng kahoy*).—The leaves are seldom used as a vegetable but in some regions of the Philippines, the young leaves have been found edible. Accordingly, the leaves sampled are very young ones. They measured 12 to 19 cm and are divided at the base into 5 to 7 narrow segments.

SWAMP CABBAGE (*Kangkong*).—These are the leaves of an aquatic plant which thrives in both stagnant streams and fresh-water ponds. The terminal shoots were used in sampling. The leaves used measured 5 to 8 cm long. *Kangkong* is widely used in combination with fish or meat in soups and other dishes and as a salad seasoned with either *kalamansi* or *bagoong*.

APPENDIX 15 (CONTINUED)

Durian.—This is the seed of the durian fruit described in another group in this paper. The seed has no commercial value. The analysis reported was made on the boiled seeds.

Galo.—This tree is distributed in forests at low and medium altitudes from northern Luzon to Mindanao, and reaches to a height of 15 m or more and a diameter of 50 cm. The leaves are alternate and somewhat pointed at both ends. Galo nut is produced in the axils of the leaves with a thin shell about 2 cm in diameter. It has an edible kernel of good quality and taste.

Marmag.—This fruit is described elsewhere in this report. The analysis reported here is made on the boiled seeds. The seeds, like those of the jackfruit, are large and starchy and are eaten either boiled or roasted.

MUNG BEAN (*Munggo*).—The bean samples were grown by the Bureau of Plant Industry and values presented are averages of 9 determinations on 9 varieties of the bean.

COWPEAS (*Paypay*).—These are the mature seeds of the cowpea legume. The various samples analyzed are of different varieties and they differ not only in size but also in color. Except for the first sample, the cowpeas presented in this report were from the Bureau of Plant Industry.

WATERMELON SEEDS (*Pakwacin, huté*).—Watermelon seeds have a good commercial value in the Philippines. The proximate composition of the white edible portion of the seed is comparable to that of peanut. A previous analysis has been reported in our first paper.

LEAFY VEGETABLES

Alibangbang.—This is a small sized but stocky tree growing to a height of 5 to 10 m in regions subject to long dry seasons. It has yellowish brown checked bark and a dense crown of branches. The leaves, which are broader than long, are 5 to 10 cm long, heart-shaped at the base and deeply notched at the apex. Alibangbang leaves, because of their sour taste, are used considerably for flavoring meat and fish as in "sinigang." Samples studied were obtained in San Rafael, Bulacan.

Alitasya.—This herb is found in thickets near towns at low altitude, and is being cultivated in Isabela, Manila, and Los Baños. The tender leaves of this trailing herb are eaten as pot-herb. Its leaves which are ovate, pointed at the tip and rounded at the base, measure 2½ to 8 cm in width. The sample reported in this paper was gathered from a Pasay side-street. Another sample has been reported in the second paper of this series.

Dampalit.—Another sample of this prostrate plant has been previously reported in the second paper.

PRICKLY-CHAFF FLOWERS (*Hanggod*).—This plant is a coarse, (or) rambling, erect, branching, hairy, annual herb from ½ to 2 m in height. The leaves are opposite, ovate, pointed at the base and tip, with short petioles, and 6 to 15 cm long. It is a weed which is distributed throughout the Philippines in open, waste places at low and medium altitudes.

Kamokamotihan.—This is a hairy herbaceous vine, widely distributed and found growing at low and medium altitudes in waste places and thickets. Its young leaves and tender stems are in popular use in the Ilocano regions, particularly in Pangasinan, as a leafy vegetable. The leaves are somewhat heart-shaped, 5 to 15 cm long. Its stems are often purplish, 2 to 4 angled and narrowly winged. The sample reported in this paper was gathered from a Singalong (Manila) backyard. An analysis was included in the first paper.

SWAMP CABBAGE (*Kangkong*).—This smooth, widely spreading vine is another leafy vegetable which has been reported in the second paper.

CASHEW (*Kasuy*).—This tree is found cultivated throughout the Philippines for its fruit. The young leaves are also eaten as a vegetable. This is a very small tree with a usually small and crooked trunk. The leaves are simple, smooth, alternate, ovate, 10 to 20 cm long and 7½ cm wide with a slightly rounded emarginate apex. The sample of "kasuy" tops reported in this paper came from Ilocos Sur. The analysis of the fruit was included in the second paper.

Kulasita.—The tops of this perennial herb of the green variety has been reported in our first paper. The present samples consisted of tender cuttings of the red variety from the gardens in Balara Filters (Quezon City).

BLACK NIGHT SHADE (*Lubi-lubi*).—This plant is about one meter or less in height. The stems are green and somewhat 3-angled. The leaves sampled came from Albay, Albay. The leaves are arranged in clusters, oblong, 10 to 30 cm long with lobed margins. It is popularly used as a vegetable especially in the Bicol Region.

MANGO (*Mangga*).—Analyses of mango fruit are included in the previous papers. The present sample consisted of shoots and tender stems which are used for flavoring meat and fish in some localities.

Saraldia.—This plant is a slender, spreading herb with small, whorled and spatulate leaves and white flowers with long,

APPENDIX 15 (CONTINUED)

slender petioles. The whole plant without the roots is eaten as a vegetable. It is bitter but taste for it can be developed. This plant is called "papait" in Ilocano.

PARSLEY (*Peregil*).—This erect, copiously branched herb is grown to some extent in Baguio. It reaches a height of about 90 cm. From its thick aromatic taproot radical rosette leaves 2 to 3 pinnate arise, ultimate segments being ovate-cuneate. Its curly leaves are used as a seasoning and for garnishing various dishes.

TAMARIND (*Sampalok*).—The first two papers of this series include the analyses of the green and ripe fruits of this large tree. The present sample consisted of young leaves which, like the green fruit are used for seasoning a native dish called "sinigang."

SPANISH PLUM (*Siniguwelas*).—The fruit has been reported elsewhere in this paper. The present sample consisted of shoots and tender stems which are used for seasoning "sinigang."

Tubod-lafigit.—This fern grows wild in moist places like banks of streams, though it is also found around bamboo thickets. The plant has an slender stem and leafy blades which spread out resembling an umbrella around a spike of about the same length. The tender and brittle fronds make an excellent green vegetable which is eaten either raw or cooked as a salad or as a component of stew.

Watercress.—This green aquatic plant, with creeping, floating and much-branched stem, is abundant in shallow waters and small streams in Trinidad Valley, Benguet. Watercress is used as a salad on account of its appetizing property. The sample which was obtained in Baguio, had erect and pinnate leaves, which measured 1½ to 2 cm long and 1½ to 2½ cm wide.

SEAWEEDS

Balbalulang.—This seaweed is netlike in appearance, has a spongy texture and is brown in color. It grows under the sea on rocks. It is never cooked or blanched, for it soften and disintegrates with heat. The sample came from Ilocos Norte.

Kulot.—It grows under the sea on rocks 5 to 7 meters deep. The fronds are not cartilaginous. The branchlets are very small and spinelike. It is blanched before eaten. The sample also came from Ilocos Norte.

Pulpulito.—This seaweed is most commonly found along the coast of Ilocos Norte and La Union, growing on rocky and sandy

places. The thallus is described as being "more or less regularly dichotomous and cylindrical." It is eaten raw as a salad mixed with other vegetables.

FLOWERS

HIBISCUS (*Gumamela*).—This plant is an erect, much branched, smooth shrub 1 to 4 m in height, and is cultivated for ornamental purposes throughout the Philippines. The leaves are ovate and 7 to 12 cm long with coarsely toothed margins. The flowers which are solitary, axillary, very large, about 10 cm long and 12 cm in diameter are reported to be used for food. Its green calyx is about 2 cm long and with ovate lobe. The petals are red, obovate, rounded, and imbricate.

Kakawati.—This tree is used for ornamental purposes, because of its pink to light violet flowers. The wood is hard and durable so that the tree is used to make a living fence. The flowers are edible and used as vegetable.

TAMARIND (*Sampalok*).—The flowers of this large tree are also used for seasoning native dishes because its acid taste.

SHOOTS AND STEMS

Rhubarb.—This plant is grown to some extent around Baguio, thriving at higher elevations and in rich soil. It is raised in the rosette stage with large leaves. The pinkish fleshy leaf stalks are highly prized as filler for pies and for making sauces.

COCONUT BUD OR CABBAGE (*Ubod ng niyog*).—The innermost and tender upper position of the coconut trunk is known as "ubod." It is almost milky-white in color, rather crispy and juicy and has a sweetish taste. "Ubod" is considered a delicacy. It makes an excellent salad, is used in native pickles, and may be served plain boiled, but is most popularly used in preparing "lumpia."

FRUITS

GUAVAS (*Bayabas*).—This fruit is available throughout the year. Its analysis has been reported in the second paper of this series. In this report, both the red and white variety were analyzed.

Bignay.—This is the fruit of a small tree. It is not widely cultivated nor is the fruit very popular among Filipinos. However, bignay makes an excellent wine and jam. The fruit is small, hardly 1 cm long, fleshy, ovoid, smooth, dark red in color and slightly acidic even when ripe. It contains a single seed. The fruits analyzed were harvested from a private garden in Mandalayong, Rizal.

Item	Local name	Scientific name	English name	Edible portion	Moisture	Nitrogen	Fat	Fat Ash	Crude fiber	Calcium	Phosphorus	Iron	Carotene	Thiaflavin	Riboflavin	Niacin	Ascorbic
					Representative values for 100 gm edible portion												
				Per cent	gm	gm	gm	gm	gm	mg	mg	mg	mg	mg	mg	mg	mg
	C. FLOWERS																
1	Gumamela	Hibiscus rosa-sinensis L.	Hibiscus	61.6	89.8	0.064	0.36	0.55	1.66	4.04	26.68	1.69	.....	0.031	0.016	0.61	4.16
2	Kekawali	Gardenia [illegible]															
3	Sampaloc	Tamarindus indica L.	.....	65.0	64.7	0.391	0.67	0.48	1.33	17.11	83.65	6.83	.....	0.136	0.092	0.93	11.73
	D. SHOOT AND STEM																
1	Rhubarb	Rheum rhaponticum L.	Rhubarb	72.9	94.6	0.070	0.38	0.72	0.77	79.40	10.03	0.61	0.0450	0.022	0.025	0.20	20.63
2	Ubod	Cocos nucifera L.	Coconut shoot	33.9	89.6	0.329	0.68	1.31	0.76	27.26	61.53	tr.	.....	0.034	0.037	1.19	10.60
	E. FRUITS																
1	Bayabas, pula	Psidium guajava L.	Guavas, red	95.0	63.9	0.203	0.33	0.90	6.87	48.80	31.05	0.62	0.0916	0.077	0.018	2.19	83.13
2	Bayabas, puti	Psidium guajava L.	Guavas, white	97.4	67.8	0.263	0.36	0.89	6.65	26.19	31.99	0.60	0.2130	0.070	0.019	2.37	112.60
3	Bacay	Artocarpus incisa L.	.....	13.2	83.4	0.103	0.60	0.72	1.45	33.61	22.21	0.45	0.0059	0.011	0.081	0.23	9.92
4	Datile	Muntingia calabura L.	.....	100.0	71.2	0.329	0.60	0.83	2.36	109.45	40.20	0.61	tr.	0.031	0.061	0.44	152.19
5	Duhat	Syzygium cumini (L.) Skeels	Java plum, Black plum	63.7	78.4	0.163	0.13	1.09	0.29	31.20	23.45	0.22	tr.	0.002	0.009	0.23	10.16
6	Durian	Durio zibethinus Murr.	Durian	14.6	64.9	0.211	0.71	0.91	1.87	12.14	65.39	1.13	.....	0.365	0.172	1.13	60.00
7	Kamoto, mutado	Chrysophyllum cainito L.	Star apple	62.8	80.6	0.213	0.65	0.25	0.03	14.80	8.80	0.24	tr.	0.011	0.011	0.85	6.60
8	Kamatsili	Pithecellobium dulce (Roxb.) Benth.	Guamachil	60.6	76.6	0.606	0.88	0.47	1.46	10.24	39.02	0.40	0.8660	0.139	0.038	0.78	122.10
9	Kasuy	Anacardium occidentale L.	Cashew	90.2	82.8	0.090	0.76	0.35	0.30	8.89	13.46	0.46	0.0030	0.025	0.018	0.31	159.86

APPENDIX 15 (CONTINUED)

TABLE 1.—Composition of some Philippine food plants—Fruits—Continued.

Item	Local name	Scientific name	English name	Edible portion	Moisture	[illegible]	[illegible]	Ash	Crude fiber	Calcium	Phosphorus	Iron	Carotene	Thiamine	Riboflavin	Niacin	Ascorbic acid
				Representative values for 100 gm. edible portion													
				Per cent	gm.	gm.	gm.	gm.	gm.	mg.	mg.	mg.	mg.	mg.	mg.	mg.	mg.
	[illegible]	[illegible]															
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.021	10	.33	.4	13.7	9.7	.23	.004	.031	.046	.26	83.0
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.137	.22	.71	.4	7.8	43.3	.64	.019	.013	.027	.68	17.5
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.103	.43	.62	.6	12.4	29.5	.97	.328	.018	.029	.58	17.7
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.122	.37	.48	.3	7.7	17.6	.86	.226	[illegible]	.033	.62	8.0
	[illegible]	[illegible]	Tamarind [illegible]	[illegible]	31.3	[illegible]	.19	.39	.3	23.8	19.0	.64	.015	.122	[illegible]	.65	24.7
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.23	.72	1.1	8.4	26.6	1.96	.053	[illegible]	[illegible]	.83	12.7
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.21	.63	.7	12.4	34.3	1.18	.160	.133	.048	.42	63.0
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.37	.3	20.5	11.3	.41	[illegible]	[illegible]	.018	.26	53.0
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.44	2.8	26.8	9.4	.29	[illegible]	[illegible]	[illegible]	.33	[illegible]

TABLE 2.—Composition of some Philippine food plants—Leafy vegetables.

Item	Local name	Scientific name	English name	Edible portion	Moisture	[illegible]	[illegible]	Ash	Crude fiber	Calcium	Phosphorus	Iron	Carotene	Thiamine	Riboflavin	Niacin	Ascorbic acid
				Representative values for 100 gm. edible portion													
				Per cent	gm.	gm.	gm.	gm.	gm.	mg.	mg.	mg.	mg.	mg.	mg.	mg.	mg.
	Alugbati	Basella rubra L.	Malabar nightshade	[illegible]	[illegible]	.223	.33	1.13	.7	111.5	42.7	2.23	[illegible]	.023	.118	.42	[illegible]
	Gabe	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.19	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4	[illegible]	[illegible]	[illegible]	[illegible]	.211	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	Squash tops	[illegible]	[illegible]	.115	.72	1.76	1.2	81.2	[illegible]	2.71	[illegible]	[illegible]	.114	.88	12.3
	Kangkong	Ipomoea reptans [illegible]	[illegible]	......	[illegible]	[illegible]	.44	1.62	1.3	123.9	33.6	11.20	1.927	.146	[illegible]	1.87	33.2
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.31	[illegible]	.087	.211	1.07	[illegible]
(a)	[illegible]	[illegible]	[illegible]	......	[illegible]	[illegible]	[illegible]	2.46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.182	[illegible]	1.33	[illegible]
(b)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	233.6	[illegible]	11.33	[illegible]	[illegible]	.112	[illegible]	31.9
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(a)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.43	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(c)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	Mustard	87.4	94.1	[illegible]	.43	[illegible]	.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.68	[illegible]
	Pako	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.23	1.5	[illegible]	111.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	Fern	[illegible]	87.5	.191	.32	.49	1.8	23.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.37	15.5

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APPENDIX 15 (CONTINUED)

TABLE 1.—*Composition of Philippine foods.*

Local name (T., I., or V.)*	Scientific name	English name	Edible portion	Moisture	Nitrogen	Ether extract	Ash	Crude fiber	Calcium	Phosphorus	Iron	Carotene	Thiamine	Riboflavin	Niacin	Ascorbic acid
				Representative values per 100 gm. edible portion												
			gm	gm	gm	gm	gm	gm	mg	mg	mg	mg	mg	mg	mg	mg
I. roots:																
(a) Alukado, puso	*Persea americana* Mill.	Avocado (purple form)	69.4	56.6	.128	7.23	.54	1.2	6.6	21.3	.83	.017	.038	.761	1.00	9.6
(b) Abukado, berde	do.	Avocado	[illegible]	65.6	.152	5.47	.66	1.5	3.6	13.6	.61	.076	.221	.512	1.78	3.6
(a) Paratao	*Pouteria sapota* L.	Sapote	[illegible]	[illegible]	[illegible]	1.12	.74	[illegible]	31.8	37.7	1.33	.041	.077	.243	1.25	32.5
(b) Paratao	do.	[illegible]	[illegible]	72.9	.215	.65	[illegible]	7.6	[illegible]	[illegible]	[illegible]	.032	.026	.013	1.61	154.3
(a) Dayap	*Citrus aurantifolia* Swingle	Sour lime	86.4	92.4	.113	.12	.47	1.2	19.7	16.7	tr	[illegible]	.016	[illegible]	.40	[illegible]
(b) Dayap, balat	*Citrus aurantifolia* Swingle	Lime	77.0	91.0	.661	2.35	.15	.3	13.0	11.2	tr	.003	.028	.023	.14	19.2
Dubat	do.	Lemonad	[illegible]	76.5	.212	.12	1.19	3.9	215.1	31.9	.62	.166	.002	.070	.48	67.5
Granada	*Punica granatum* L.	Java plum, black plum	67.6	81.8	.999	.13	.33	.2	13.9	11.6	.15	0	.007	.210	.31	[illegible]
(a) Kamias, berde	*Averrhoa bilimbi* L.	Pomegranate	46.2	75.5	.251	.125	1.40	.9	15.4	43.3	.97	[illegible]	.037	.016	.63	6.0
(b) Kamias, morado	*Averrhoa bilimbi* L.	Star apple, green	49.4	84.1	.132	1.02	.35	.6	19.8	16.4	.32	0	.013	.023	.39	9.3
Kaimito	do.	Star apple, purple	62.8	80.5	.213	.43	.23	[illegible]	16.3	8.6	.24	tr	.011	.011	.09	5.6
Kaimito	*Pouteria caimito* (Ruiz & Pav.) Radlk.	Caimito	56.4	79.6	.213	.26	.23	1.1	19.0	35.9	.35	0	.139	.107	.41	156.3
Kasoy	*Anacardium occidentale* L.	Cashew	93.7	91.6	.133	.21	.33	.6	7.4	12.2	.29	.116	.036	.048	.24	3.7
Katmon	*Dillenia philippinensis* Rolfe	[illegible]	[illegible]	96.2	.132	.28	.25	.3	1.4	12.1	.21	.022	.010	.019	.47	231.9
Langka	*Artocarpus integrifolia* L.	Jackfruit	11.9	93.1	.646	.20	.22	.9	23.6	5.5	.11	.026	.024	.041	.24	1.9
(a) Lemon	*Citrus limonia* Osbeck	Lemon	90.1	76.5	.247	.31	.87	.7	23.3	14.0	.72	.075	.126	.263	.79	2.7
(b) Limon, balat	do.	Lemon, rind	56.1	91.5	.078	1.68	.27	.3	6.7	6.2	tr	.002	.035	.022	.12	53.3
Lanzones	*Lansium domesticum* Jack	Litchi	[illegible]	82.4	.280	.27	.54	1.9	18.9	15.7	.97	.011	.065	.129	.47	250.4
Mabolo	*Diospyros discolor* Willd.	Libury	62.9	80.0	.147	.09	.33	.3	7.6	25.6	.16	tr	.022	.036	.17	13.8
Mabolo	*Diospyros discolor* Willd.	Coromandel-apple	53.8	53.0	.976	.29	.78	1.6	34.4	21.4	.75	0	0	.012	.29	21.6
			89.3	91.1	.066	.10	.24	.9	15.2	7.7	.23	0	.029	.018	.29	15.0

* T., stands for Tagalog; I., Ilocano; and V., Visaya.

TABLE 1.—*Composition of Philippine foods*—Continued.

Local name (T., I., or V.)*	Scientific name	English name	Edible portion	Moisture	Nitrogen	Ether extract	Ash	Crude fiber	Calcium	Phosphorus	Iron	Carotene	Thiamine	Riboflavin	Niacin	Ascorbic acid
				Representative values per 100 gm. edible portion												
			gm	gm	gm	gm	gm	gm	mg	mg	mg	mg	mg	mg	mg	mg
(a) Manggas, [illegible]	*Mangifera indica* L.	Mango	75.4	82.9	.275	.11	.51	.3	19.4	21.3	.32	.129	.035	.016	.24	22.9
(b) Manggas, pahutay	do.	do.	48.3	79.3	.153	.16	.46	.3	7.7	10.6	.28	1.147	.125	.155	.54	21.7
(c) Manggas, [illegible]	do.	do.	75.2	82.3	.099	.36	.32	.5	13.1	10.3	.35	.762	.139	.042	.32	19.5
(d) Manggas, puso	do.	do.	59.4	82.7	.154	.19	.38	.4	13.1	13.6	.34	1.179	.073	.045	.67	43.9
(a) Manggas, berde	*Persea gratissima* L.	[illegible]	[illegible]	[illegible]	.646	.94	.23	.7	9.9	2.1	tr	.015	.014	.031	.15	tr
(b) Manggas, puso	do.	[illegible]	67.2	54.4	[illegible]	.12	.60	.7	7.7	5.7	.13	.012	.019	.015	.13	tr
Milon, tagalog	do.	Melon	59.9	89.0	.971	.06	.48	.3	5.7	22.5	.17	1.996	.035	.025	.23	53.9
Paraso	*Cornus panse* L.	Persimmon	71.2	93.5	[illegible]	.04	.46	.4	22.5	16.7	.32	.043	.022	.023	.23	16.7
Pangasinang masabo	do.	Persimmon	54.0	63.8	.957	.06	.56	.6	15.8	7.6	.13	.245	.012	.036	.33	111.9
	Psevdoliza fimbriata L.	Stinking salmon														
(a) Piayo	*Anonas reticulata* (L.) Merrill	[illegible]	58.3	[illegible]	[illegible]	[illegible]	1.19	[illegible]	9.5	49.3	.78	[illegible]	.002	.077	[illegible]	[illegible]
(b) Piayo	do.	[illegible]	27.6	65.1	.974	.26	.27	.5	17.9	5.0	.13	.017	.095	.016	.17	8.1
(c) Piayo	do.	[illegible]	53.2	86.6	.642	.08	.55	.5	33.7	19.2	.12	.016	.077	.039	.21	13.9
(a) Saguing, bungor	*Manilkara zapota* (L.) P. Royen	Sapote	51.1	86.6	.160	.66	.29	.5	17.9	5.0	.15	.095	.133	.026	.23	28.9
(b) [illegible]	do.	[illegible]	[illegible]	[illegible]	.219	.43	.46	.3	19.6	15.5	.59	.319	.033	.029	.66	28.3
(c) [illegible]	do.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6	[illegible]	[illegible]	.37	.111	.026	[illegible]	[illegible]	[illegible]
(d) [illegible]	do.	[illegible]	[illegible]	[illegible]	[illegible]	.26	.27	.3	[illegible]	[illegible]	.76	.264	.029	[illegible]	[illegible]	[illegible]
Sampaloc, [illegible]	do.	[illegible]	67.0	66.5	.136	.37	.65	.2	16.8	22.7	.53	.141	.025	.026	.61	23.3
Sineo	[illegible]	Tamarind, ripe	23.1	35.3	.275	.25	1.31	1.9	61.1	41.1	.29	0	.251	.096	.78	5.7
Suha	*Citrus maxima* (Burm.) Merr.	Grapefruit (pomelo)	53.3	76.7	.462	.46	.36	.9	22.5	11.9	.16	.012	.010	.029	.38	4.9
Suang balatan	[illegible]	Pomelo	61.3	[illegible]	.672	.15	.37	.3	11.1	11.3	.63	.012	.135	.115	.27	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.125	[illegible]	.42	10.4	[illegible]	[illegible]	.41	tr	[illegible]	[illegible]	[illegible]	[illegible]
Tamarindo	*Tamarindus indica* L.	Tamarind	[illegible]	[illegible]	.250	.37	.43	.2	21.7	[illegible]	.55	.245	.014	.015	.34	[illegible]
				[illegible]							tr	0	.002	[illegible]	.16	[illegible]

* T., stands for Tagalog; I., Ilocano; and V., Visaya.

Appendix 16 Famine Foods Listed in the Chiu Huang Pen Ts'Ao by B. E. Read: Sample Pages

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1.1 野生菜 (野蒿菜) YEH SHENG CHIANG.

Senecio palmatum, Pall. (M. Ch. SD) RAGWORT.

Some of the ragworts contain toxic alkaloids. This species is apparently as harmless as the edible golden ragwort. As with all this group of leafy vegetables it is ordered that they be thoroughly boiled, the bitter taste removed with repeated washing and then eaten with oil and salt. *Leaf.*

1.2 刺面菜 (刺刺芋, 千針草, 小蓟) T'ZU CHI TS'AI.

Cnicus japonicus, Maxim. (M. P.) CAT-THISTLE. Porter 214.

Su Sung (11th cent.) says, in the spring the young leaves with the roots are used for food and considered very palatable. Bret. 160, used all over China. *Shoot, leaf.*

1.3 大蓟 TA CHI.

Cnicus Spicatus, Maxim (M. SD. BR.) TIGER-THISTLE.

The root is considered deleterious, but the leafy shoots have a natural sweet taste and are said to be excellent eating. *Shoot, leaf.*

1.4 山莧菜 SHAN HSIEN TS'AI.

Achryanthes bidentata, BL. (M. P.)
and *A. Aspera*, L. (百倍, 紫花莧, 野莧菜, 牛膝)
CHAFF-FLOWER. Porter 62.

Cultivated in North China and Szechuan for food, Li Shih-chen. In the Moluccas the young leaves are served as a spinach, Burkill 33. The Herbal says the root is poisonous but the leafy shoots are edible. *Shoot, leaf.*

1.5 款冬花 K'UAN TUNG HUA.

(款冬, 橐吾, 虎鬚, 冬花, 款冬花, 款冬, 水斗菜, 水斗菜, 款冬)

Tussilago Farfara, L. (M. H. Ch.) COLTSFOOT. Bailey 740.

The young leaves after boiling are washed to remove the bitter taste due to the presence of tannin, and are then eaten with oil and salt. They are rich in mucilage which accounts for their use in domestic medicine as a demulcent, United States Disp. p. 1375. The bitterness is also due to the presence 2.63% of a glucoside. The ash 3.4% is rich in zinc. *Leaf.*

1.6 萹蓄 (萹竹) PIEN HSÜ

Polygonum aviculare, L. (M. Br. Ch.) KNOTWEED.
GOOSEWEED.

This is known in Germany as Homeriana-Thee or Weidermannscher-Thee. Like China tea it contains tannin, but the flavour is supported by 2 to 2½% of sugar and a volatile oil with a little resin and wax. The herb yields 2.44% of ash unusually rich in zinc. The fresh plant contains 87% water, (Wehmer 273). *Shoot, leaf.*

APPENDIX 16 (CONTINUED)

Famine Foods

3.3. 鐵甘草 T'IEH KAN HAO.
Heteropappus hispidus, Less. (M.)

3.4. 山甜菜 SHAN T'IEN TS'AI — *Leaf.*
Unidentified. *Beta sp.*

3.5. 水蘇子 SHUI SU TZU. — *Leaf.*
Sphagnum japonicum, Broth. (BN. 232)

3.6. 蒲花菜 FENG HUA TS'AI — *Shoot, leaf.*
Nasturtium palustre, D. C. (BN. Ch. SD. J.)

MARSH CRESS. BN. 721.

3.7. 鵝兒腸 E ERH CH'ANG. — *Shoot, leaf*
Stellaria aquatica, Scop. (M. Bi. H.)

STARWORT CHICKWEED. P72 BN. 211.

Li Shih-chen describes it as a platable, sweet, tender, pot-herb. Highly recommended by Charles Johnson in the Useful Plants of Great Britain. It has over 13% ash with over 1.5% calcium oxide and much iron. — *Shoot, leaf*

3.8. 粉條兒菜 FEN T'IAO ERH TS'AI.
Aletris japonica, Lamb. (M. BN Ch.) STAR GRASS. BN. 829.
A. spicata, Franch. (Ch.)

3.9. 辣辣菜 LA LA TS'AI. — *Leaf.*
Lepidium virginicum, L. (Ch.). WILD PEPPERWORT. P53.

This is very similar to garden cress *L. sativum*, L. 4/21. eaten in Western countries. It is rich in vitamin C. — *Shoot, leaf.*

3.10. 毛連菜 (第十八) MAO LIEN TS'AI.
Elephantropus scaber, L. (M). ELEPHANTS FOOT

Eaten by cattle throughout the tropics, Burkill. Mucilaginous and astringent. — *Leaf*

3.11. 小桃紅 HSIAO T'AO HUNG.
(漢語藥名考 [illegible]) (中藥學)
Impatiens balsamina, L. (M. H.)

BALSAM. TOUCH-ME-NOT BN 1318. Bailey 473.

The Balinese eat these leaves, (Dept. Plant Nat. Ind. 10021). They contain sugar and starch. The U.S. Dispensatory says it resembles other species of this genus in its acrid, purgative and emetic effects. — *Shoot, leaf*

3.12. 蒼耳兒菜 CH'ING CHIA ERH TS'AI.
Heliotropia muciflora, Wild. (BN 615, Ch.) — *Shoot, leaf.*

APPENDIX 16 (CONTINUED)

Romanized	Chinese Name	Chiu Huang Ref	Romanized	Chinese Name	Chiu Huang Ref
Ch'a Hua Erh	茶花兒	[illegible]	Ch'ien Chu Ts'ai	千屋菜	II. 31
Ch'a Shu	茶[illegible]	IX. 1.	Ch'ien Hu	荷[illegible]	I. 29
Ch'ai Chiu	柴[illegible]	XIV. 18.	Ch'ien Ken	茜根	[illegible]
Ch'ai Hu	柴[illegible]	I. 25	Ch'ien Liang Chin	千兩金	[illegible]
Ch'ai Yu	柴[illegible]	[illegible]	Ch'ih Chin	赤[illegible]	[illegible]
Ch'an Chin Mu Tan	[illegible]	[illegible]	Ch'ih Hsiao Tou	赤小豆	XII. 10.
Ch'ang P'u	菖[illegible]	VI. 9	Ch'ih T'ou Ts'ai	赤頭菜	II. 17.
Ch'ang Sui Pa	常十八	[illegible]	Ch'ih Ts'ai	赤菜	[illegible]
Ch'ang Szu	常思	[illegible]	Ch'ing Ch'i	青[illegible]	II. 2.
Ch'ang Yang	昌[illegible]	[illegible]	Ch'ing Chia Erh Ts'ai	[illegible]	III. 12
Ch'e Chien Tzu	車[illegible]	[illegible]	Ch'ing Kang Shu	青[illegible]	IX. 23
Ch'e Ken Ts'ai	車根菜	III. 19	Ch'ing Man T'ou	青蔓[illegible]	[illegible]
Ch'e Lun Ts'ai	車輪菜	[illegible]	Ch'ing She Tzu Tiao	[illegible]	X. 10
Ch'en Chin Pai	[illegible]	[illegible]	Ch'ing Shi	[illegible]	[illegible]
Ch'i Chang Ts'ao	[illegible]	[illegible]	Ch'ing T'an Shu	青[illegible]	[illegible]
Ch'i Ching	[illegible]	[illegible]	Ch'ing Tzu	青[illegible]	VII. 4
Ch'i Ken	[illegible]	[illegible]	Ch'ing T'ou Chi	[illegible]	[illegible]
Ch'i Ku	[illegible]	[illegible]	Ch'ing Yang Shu	[illegible]	IX. 20.
Ch'i Ni	[illegible]	[illegible]	Ch'ing Yu	青[illegible]	[illegible]
Ch'i Sui	[illegible]	[illegible]	Ch'iu Ch'in	[illegible]	[illegible]
Ch'i Shu Ya	[illegible]	IX. 19	Ch'iu Shu	[illegible]	XI. 11.
Ch'i Ts'ai	[illegible]	XIV. 27.	Ch'iu Chu Shu	[illegible]	IX. [illegible]
Ch'ia Pu Ch'i	[illegible]	[illegible]	Ch'iu Kung	[illegible]	IX. 37
Ch'iang Ch'u	[illegible]	[illegible]	Ch'iu Ch'i	[illegible]	[illegible]
Ch'iang Mi	[illegible]	[illegible]	Ch'iu Kua	[illegible]	[illegible]
Ch'iang Mi	[illegible]	IV. 23.	Ch'iu Ma	[illegible]	[illegible]
Ch'iao Mai	[illegible]	VII. 1.	Ch'iu Shih	[illegible]	[illegible]
Ch'iao Mai Miao	[illegible]	XII. 5	Ch'iu T'iao Shu	[illegible]	XI. 4
Ch'iao Nao Hsiung	[illegible]	[illegible]	Ch'iuan	[illegible]	[illegible]
Ch'ien	[illegible]	[illegible]	Ch'uan Hsiung	[illegible]	I. 31.
Ch'ien	[illegible]	[illegible]	Ch'uan Ku	[illegible]	VII. 7
Ch'ien Chen T'ao	千針草	[illegible]	Ch'uan T'ao Hua	[illegible]	[illegible]

APPENDIX 16 (CONTINUED)

Eriochloa villosa	7.9
Eritrichium pedunculiste	4.13
Euphorbia helioscopia	1.19
,, humifusa	5.12
Euptelea polyandra	9.9
Euryale ferox	13.23
Eutrema Wasabi	2.22
F	
Fagopyrum esculentum	12.8
Fibristylis sub-bisumata	8.11
Ficus carica	10.9
Foeniculum vulgare	1.22
Forsythia suspensa	1.34
Fragaria indica	7.20
G	
Galium verum	7.27
Gentiana scabra	1.27
Geranium nepalense	5.19
Gleditschia sinensis	9.40
Glycine hispida	11.3
Glycine ussuriensis	12.13
Gnaphalium japonicum	12.2
Gymnostemma pedatum	5.18
H	4.11
Halesia corymbosa	9.23
Hemerocallis fulva	1.10
Heteropappus hispidus	3.3
Hibiscus mutabilis	9.17
,, syriacus	9.3
,, trionum	5.15
Humulus japonicus	1.32
Hygrophila lancea	5.10
I	
Impatiens balsamina	3.11
Imperata arundinacea	8.14
Incarvillea sinensis	1.33
Indigofera decora	12.5
,, Pseudotinctoria	11.2
Inula britanica	1.16
Isatis tinctoria	1.7
J	
Juglans regia	13.2
K	
Kochia scoparia	2.7
Koelreuteria paniculata	9.29
L	
Lactuca brevirostris	14.14
,, debilis	3.1
,, denticulata	13.28
,, ,, var.	14.14
,, sororia	14.12
Lathyrus maritimus	12.1
,, palustris	7.16
Leonurus sibiricus	1.18
Lepidium sativum	4.21
,, virginicum	3.9
Leptodeza juncea	8.20
,, macrocarpa	7.28
,, striata	7.10
Ligustrum lucidum	9.11
Lilium Brownii	6.2
Limnanthemum nymphoides	8.24
Liriope spicata	[illegible]
Lobelia cassioides	4.1

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Appendix 17 Flora Vitiensis: A Description of the Plants of the Viti or Fiji Islands With an Account of Their History, Uses, and Properties by B. Seemann: Sample Pages

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FLORA VITIENSIS:

A DESCRIPTION OF THE PLANTS

OF THE

VITI OR FIJI ISLANDS

WITH

AN ACCOUNT OF THEIR HISTORY, USES, AND PROPERTIES.

BY

BERTHOLD SEEMANN, PH.D., F.L.S., F.R.G.S.,
[illegible]
COMMISSIONED BY THE GOVERNMENT TO EXPLORE THE FIJI ISLANDS;
[illegible]

WITH ONE HUNDRED PLATES BY WALTER FITCH, F.L.S.

"WE KNOW NOTHING OF THE FIJI ISLANDS BOTANICALLY, EXCEPT THAT THEY CONTAIN MUCH FOREST OF SANDALWOOD."
Endlicher: Flora of the South Sea Islands, 1836.

LONDON
L. REEVE AND CO., 5, HENRIETTA STREET, COVENT GARDEN.
1865–73.

APPENDIX 17 (CONTINUED)

Order LXXV AMARANTACEÆ.

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Appendix 18 Marine Algae as Human Food in the Pacific Region by B. H. S. Leber: Sample Pages

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Marine Algae as Human Food in the Pacific Region

By

BARBEL HANNELORE SCHONFELD LEBER
A.B. (University of California, Davis) 1973

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF ARTS

in

Geography

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA

DAVIS

Approved:

Committee in Charge

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TABLE 1

Mineral Content of Seaweeds

Name of Seaweed	Mineral contents, as mg/g in dry matter						
	Total ash	K	P	Ca	Mn	Fe	Cr
Chaetomorpha crassa	121	13.2	0.8	11.3	0.199	0.561	0.00182
Codium pugniformis	350	25.8	2.8	8.6	0.052	0.591	0.00253
Eisenia bicyclis	138	22.5	1.1	13.1	0.004	0.09	0.00074
Gelidium sp.	32	0.3	0.2	3.5	0.041	0.224	0.0005
Hijikia fusiforme	192	34.3	0.6	19.4	0.019	0.167	0.00074
Sargassum thumbergii	177	23.5	1.5	22.8	0.235	0.660	0.00015
Ulva sp.	190	5.5	1.7	5.5	0.012	0.526	0.00134

Source: Ishibashi and Yamamoto, 1960; data reordered by Subba Rao, 1965.

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TABLE 2

Composition of Seaweeds

Name of Seaweed	Expressed as %					
	Crude Protein	Fat	Carbohydrate	Fiber	Moisture	Ash
Porphyra tenera	28.0	0.8	40.1		17.1	10.3
Nostoc commune	20.9	1.2	55.7	4.1	10.6	7.5
Enteromorpha linza	19.3		46.2		13.5	19.2
Ulva lactuca & *U. fasciata*	14.9	0.04	50.6	0.2	18.7	15.6
Geldium sp.	12.56	-	50.13 (includes galactan, and pentosans)	17.89	-	4.23
Enteromorpha compressa	12.4	53.0			13.6	10.4
Undaria pinnatifida	11.6	0.3	37.8		18.9	31.3
Hijikia fusiforme	9.9	0.5	56.9		16.1	16.9
Laurencia botryoides & *Laurencia papillosa*	8.62	1.21	53.79 (Either free extract)	8.38	9.33	18.66
Gracilaria coronopifolia	7.9	0.05	58.4	3.0	12.85	17.8
Laminaria spp. (av.)	5.85	1.15	41.95	6.7	23.5	21.1
Arthrothamnus bifidus	5.8	0.7	45.6	6.4	24.4	17.0
Sargassum spp.	5.01	1.29	30.24	5.13	33.44	24.89
Gracilaria sp. (probably *G. confervoides*)	4.3	-	24.3	4.3	-	3.55
Enteromorpha sp. (fresh)	2.8	0.05	-	-	90.3	1.6

Source: Subba Rao, 1965:16

APPENDIX 18 (CONTINUED)

EDIBLE PHAEOPHYTA USED IN THE PACIFIC REGION

Alaria crassifolia (Japan)

Arthrothamnus bifidus (Japan)

A. kurilensis (Japan)

Chnoospora fastigiata var. pacifica (Hawaii)

Cladosiphon decipiens (Japan)

Colpomenia sinuosa (Hawaii)

Dictyopteris australis (Hawaii)

D. pardalis (Hawaii)

D. plagiogramma (Hawaii)

Dictyota acutiloba var. distorta (Hawaii)

D. dichotoma (Hawaii)

Durvillea antarctica (New Zealand)

Eckloniа stolonifera (Japan)

Ectocarpus indicus (Hawaii)

Ectocarpus sp. (Hawaii)

Eisenia bicyclis (Japan)

Endarachne sp. (Japan)

Hizikia fusiformis (Japan)

Hydroclathrus cancellatus (Hawaii)

Hydroclathrus sp. (Philippines)

Kjellmaniella sp. (Japan)

Laminaria angustata (Japan)

L. cichorioides (Japan)

L. diabolica (Japan)

L. fragilis (Japan)

L. japonica (Japan)

L. ochotensis (Japan)

L. religiosa (Japan)

L. yezoensis (Japan)

Nemacystus decipiens (Japan)

Nemacystus sp. (Japan)

Padina australis (Indonesia)

P. pavonia (Hawaii)

Petalonia sp. (Japan)

Phyllitis fascia (Japan)

Sargassum aquifolium (Indonesia)

S. cymosum (Hawaii)

S. echinocarpum (Hawaii)

S. enerve (Japan)

S. granuliferum (Indonesia)

S. polycystum (Indonesia)

S. polyphyllum (Hawaii)

Sargassum sp. (Hawaii, Indonesia, Philippines)

Tinocladia crassa (Japan)

Turbinaria conoides (Indonesia)

T. ornata (Indonesia, Hawaii)

Undaria pinnatifida (Japan)

APPENDIX 18 (CONTINUED)

EDIBLE RHODOPHYTA USED IN THE PACIFIC REGION

Acanthopeltis japonica (Japan)

Acanthophora spicifera (Indonesia)

Acetabularia major (Indonesia)

Agardhiella sp. (Philippines)

Ahnfeltia concinna (Hawaii)

Ahnfeltia sp. (Japan)

Amansia glomerata (Hawaii)

Asparagopsis sanfordiana (Hawaii)

A. taxiformis (Hawaii)

Camylaephora humeptites (Japan)

Carpopeltis affinis (Japan)

C. flabellata (Japan)

Centroceras clavulatum (Hawaii)

Ceramium sp. (Japan)

Champia compressa (Hawaii)

Chondria tenuissima var. *intermedia* (Hawaii)

Chondrus crispus (Japan)

C. elatus (Japan)

C. ocellatus (Japan)

Chylocladia ripens (Hawaii)

Digenea simplex (Japan)

Eucheuma edule (Indonesia)

E. gelatinae (Philippines)

E. muricatum (Philippines, Indonesia)

E. nanulosum (Japan)

E. serra (Indonesia)

E. spinosum (Indonesia)

Eucheuma sp. (Japan)

Galaxaura lapidescens (Hawaii)

G. rugosa (Hawaii)

Gelidiella acerosa (Japan)

Gelidiopsis rigida (Indonesia)

Gelidium amansii (Japan)

G. attenuatum (Hawaii)

G. corneum (Hawaii)

G. divaricatum (Japan)

G. filicinum (Hawaii)

G. japonicum (Japan)

G. latifolium (Hawaii)

G. micropterum (Hawaii)

G. pacificum (Japan)

G. pulvinatum (Hawaii)

G. pusillum (Hawaii)

G. rigidum (Indonesia)

G. subcostatum (Japan)

G. subfastigiatum (Japan)

G. vagum (Japan)

Gelidium sp. (Hawaii)

Gigartina tenuis (Japan)

Gigartina sp. (Indonesia, New Zealand)

Gloiopeltis sp. (Japan)

Gracilaria bursa-pastoris (Japan)

G. coronopifolia (Hawaii)

G. crassa (Philippines)

G. edulis (Philippines)

G. eucheumoides (Philippines)

G. lichenoides (Indonesia, Philippines)

G. minor (Indonesia)

G. salicornia (Indonesia)

G. taenioides (Indonesia)

G. textorii (Japan)

G. verrucosa (Japan)

APPENDIX 18 (CONTINUED)

Gracilaria sp. (New Zealand)

Grateloupia filicina (Japan, Philippines, Hawaii)

Griffithsia sp. (Hawaii)

Gymnogongrus disciplinalis (Hawaii)

G. flabelliformis (Japan)

G. japanicus (Indonesia)

G. verrucularis var. *americanus* (Hawaii)

Halymenia durvillaei var. *formosa* (Hawaii, Philippines)

Hypnea armata (Hawaii)

H. cenomyce (Indonesia)

H. cervicornis (Indonesia)

H. divaricata (Indonesia)

H. musciformis (Indonesia)

H. nidifica (Hawaii)

Hypnea sp. (Japan)

Iridaea cordata (Hawaii)

Laurencia dotyi (Hawaii)

L. flexilis (Hawaii)

L. intermedia (Hawaii, Philippines, Indonesia)

L. papillosa (Hawaii, Philippines)

L. pannosipillata (Hawaii)

L. perforata (Hawaii)

L. pinnatifida (Hawaii)

L. pinnatifida var. *osmunda* (Hawaii)

L. succisa (Hawaii)

L. virgata (Hawaii)

Laurencia sp. (Hawaii)

Liagora boergesiana (Hawaii)

L. farinosa (Philippines)

Meristotheca japonica (Japan)

M. papulosa (Japan)

Neoagardhiella baileyi (Japan)

N. gaditana (Japan)

N. vermicularis (Japan)

Nitophyllum sp. (Hawaii)

Polysiphonia mollis (Hawaii)

Porphyra angustata (Japan)

P. dentata (Japan)

P. kuniedai (Japan)

P. leucosticta (Hawaii)

P. okamurai (Japan)

P. onoi (Japan)

P. pseudolinearis (Japan)

P. tenera (Japan)

P. umbilicalis (Japan)

P. yezoensis (Japan)

Porphyra sp. (Hawaii, Philippines)

Pterocladia capillacea (Hawaii)

Pterocladia sp. (Japan)

Sarcodia montagneana (Indonesia)

Sarcodia sp. (Japan)

Spyridia snindla (Hawaii)

Streblocladia sp. (Hawaii)

APPENDIX 18 (CONTINUED)

EDIBLE CHLOROPHYTA USED IN THE PACIFIC REGION

Caulerpa lentillifera (Philippines)

C. peltata (Philippines)

C. racemosa (Philippines, Indonesia)

C. racemosa var. *clavifera* (Indonesia)

C. racemosa var. *laetivirens* (Indonesia)

C. racemosa var. *peltata* (Indonesia)

C. serrulata (Philippines)

C. sertularioides (Philippines)

Chaetomorpha antennina (Hawaii)

C. crassa (Philippines)

Cladophora nitida (Hawaii)

Codium arabicum (Hawaii)

C. dichotomum (Japan)

C. edule (Hawaii, Indonesia)

C. fragile (Japan)

C. latum (Japan)

*C. mueller*i (Philippines)

C. reedii (Hawaii)

C. tenue (Philippines)

Enteromorpha compressa (Philippines)

E. flexuosa (Hawaii)

E. hopkirkii (Hawaii)

E. intestinalis (Hawaii, Japan, Philippines)

E. linza (Hawaii, Japan)

E. plumosa (Hawaii)

E. prolifera (Hawaii)

E. prolifera var. *tubulosa* (Hawaii)

Halimeda opuntia (Bismarck Archipelago)

Monostroma sp. (Japan)

Stigeoclonium amoenum (Hawaii)

Ulva fasciata (Hawaii)

U. lactuca (Philippines)

U. lactuca var. *laciniata* (Hawaii)

U. lactuca var. *rigida* (Hawaii)

U. pertusa (Japan)

Ulva sp. (Hawaii)

Valonia utricularis (Hawaii)

Appendix 19 Wild and Emergency Foods of Australian and Tasmanian Aborigines by F. R. Irvine: Sample Pages

Astroloma humifusum, Ground Berry, Native Gooseberry (T.); fruit is edible, viscid, sweetish pulp, large stone ([16](?), All exc. Q.), *A. humifusa*, also *A. pinifolia*.

Barringtonia Careya=*Careya australis*, fruit large, calyx attached; eaten when ripe ([21], pp. 94–95).

B. racemosa, ([23], p. 10).

Berries: Wild strawberries and raspberries, including Dubbul, eaten by Brisbane tribes ([22], p. 94).

Billardiera scandens (Pittosporaceæ), Apple Berry; berries acid and pleasant when fully ripe, called dumplings by children; when unripe, a little juice produced disagreeable and persistent heartburn ([16], p. 10. All exc. W.A., and [6], p. 17, T.).

B. cymosa, ([12], p. 329. Musgrave Ranges).

Brachychiton Garrawayæ, fruit eaten ([23], p. 18).

Calamus caryotoides, Small Lawyer Cane; berries eaten at Atherton ([23], p. 10) (see B (1), p. 27, for C.A.).

Calophyllum inophyllum, fruit edible; £10 fine for injuring this or coconut tree ([14], p. 12, Q.).

Canthium oleifolium, Wild Lemon, eaten by Ngemba tribe ([10], p. 175, N.S.W.).

C. lucidum, eaten raw, Red Island ([23], p. 10).

Capparis canescens, fruit eaten raw; pulpy part good substitute for mustard ([16], p. 12 and [23], p. 10).

C. humistrata ([23], p. 10).

C. lasiantha ([23], p. 10) and Macdonald Downs, C.A. ([8], p. 37 and [21], p. 95).

C. lucida, ([23], p. 10) fruit drooping; eaten when ripe ([21], p. 95).

C. Mitchelli, Native Orange, Native or Large Pomegranate, fruit 2–3 inches diam. with rough outer rind; eaten raw when ripe ([21], p. 93–113, Q. and N.S.W.); pulp edible, agreeable perfume ([16], p. 12, all states exc. T. and W.A.; [23], p. 10; [26], p. 55). Ngemba tribe ([10], p. 175). Wailbri tribe ([27], p. 290, C.A.).

C. nobilis, fruit edible ([16], p. 13, N.S.W. and Q.; [23], p. 10).

C. ornans, ([23], p. 10, N.Q.).

C. spinosa, fruit yellow, larger than pigeon's egg, eaten raw; found round stockyards, sheepyards etc. ([21], pp. 93–113, N.S.W.; var. *nummularia* [23], p. 10).

C. umbonata ([23], p. 10).

Cassilia integerrima ([21], p. 10).

Cargillia australis, Black Plum, fruit edible ([16] p. 14, N.S.W., Q.).

Carissa Brownii, same as Konkle Berries of C.A. ([27], p. 290); also in Kimberley ([15], p. 21); N.Q. ([21], p. 66; [15], p. 21).

C. ovata, eaten raw in N.Q. ([23], p. 10); fruit agreeable, wholesome, with viscid milky juice and a few woody seeds ([16], p. 14, S.A., N.S.W., Q.; [23], p. 10).

Casuarina decaisneana, Desert Oak; young sub-acid cones eaten in C.A. ([24], p. 65).

Celtocarpus australis ([21], p. 10, N.Q.).

APPENDIX 19 (CONTINUED)

Acronychia acidula, sharply acid fruit, used for preserves ([2] p. 395).

A. imperforata, used for jam (*loc. cit.*).

Albizzia moniliferia, Mollar; pods several inches long, roasted when young and eaten ([21], p. 94, N.S.W., N.Q.).

Aleurites moluccana, Candle Nut tree; fruit roasted in slow fire till it cracks; kernel then eaten. Cooktown and Boggy Creek; N.Q. ([23], p. 9; Cf. [16], p. 5).

Antidesma bunius, known in Europe and in Java; used for jams and jellies ([2], p. 395).

A. Dallachyanum, similarly used, like red currant; Herbert River Cherry ([2], p. 395; Cf. A., p. 14).

A. erostre, used for jams and jellies (*loc. cit.*).

A. ghæsembilla, used for jams and jellies (*loc. cit.*).

A. parvifolium, Currant Bush; used for preserves.

Atalantia glauca, Native Kumquat; globular fruit ½" diam.; acid juice makes good beverage; fair preserve may be made; used for jam (*loc. cit.* [16], p. 8, N.S.W. Q.).

Avicennia officinalis, Mangrove; Aborigines of Cleveland Bay dig a hole in the ground wherein they light a good fire. This, when hot enough, they cover with stones, which, when sufficiently heated, are arranged horizontally at the bottom, the Egaie fruit laid on them, sprinkled with a little water, and covered over with bark. Earth is then placed over the whole to prevent too free evaporation of steam. During the two hours needed for baking they prepare another hole in the sand. In this the softening Egaie is transferred, and water twice poured over it. The Midamo is now fit for eating. The Aborigines resort to this sort of food during the wet season when precluded from searching for any other ([16], p. 9). Obtained in salt water estuaries, all coasts.

Roth's account ([23], p. 9) slightly differs: The fruit is roasted in ashes, covered with tea-tree bark and baked, then sieved in dilly bag, washed and dried, the "mush" poured into a piece of bark, and eaten.

A. tomentosa, fruit baked or steamed in hollows made in ground and used for fires, then removed, soaked, and baked in ashes ([21], p. 94, N.Q.).

Buchanania arborescens, Little Gooseberry; unripe fruit gathered and boiled, imparted and agreeable acidity to water, and itself tasted tolerably well; when ripe becomes sweet and pulpy like gooseberries with thinner rind; much esteemed by natives (Leichhardt; [16], p. 11).

B. Muelleri, fruits harvested in quantity in wet season (Jan.–Febr.; Q.), sometimes dried like prunes and called Bindjitj, then rubbed with red ochre and dried till hard and brittle, wrapped neatly in tea tree bark and stored for weeks or months; fruits (with seeds) later pounded with stones, kept wet during the process; dried fruit also soaked in water, or mixed with pulverised flesh and bones of the Red Kangaroo (Karrit jambol) into a kind of paste which is greatly relished.[23]

Castanospermum australe, seeds soaked in water for 8–10 days, dried, roasted, and pounded ([16], p. 14, N.A., N.S.W., Q.).

APPENDIX 19 (CONTINUED)

Central Australia: Native Cucumber; gooseberry-like fruits eaten ([11], p. 53). Yau-wulyuru, berries, including seeds, eaten by Walbri tribe ([22], p. 299). Desert Banana, Yubuli; Desert Plum; Desert Raisin; Desert Tomato; see p. 130 for these four.

SEEDS

Acacia aneura, Wandalja, gathered in a pitchi, hot embers placed on top and seed half cooked, winnowed, ground dry, and mixed with water to make a damper. Musgrave Ranges ([22], p. 220); ground and eaten ([12], pp. 157, 164). Also called Mulga (white wood) or Witchetty seeds. Walbri tribe, C.A. ([10], p. 175; [11], p. 57; [22], p. 201).

A. brachystachya, edible seeds ([12], p. 157).

A. cibaria, seeds used by natives for food ([16], p. 5).

A. Farnesiana, seeds used by natives for food ([26], p. 57; [21], p. 94).

A. frumentacea, stirling, stated large seeds ground for food ([12], p. 154).

A. Kempeana, seeds used as food ([26], p. 57; [21], p. 94).

A. lysiloma, Kalema, Wedika Bush; edible seed ([12], p. 157).

A. [illegible], Boobyalla ([illegible]), seeds picked out and eaten ([16], p. 4).

A. Murayana, Nearnaneh; seeds roasted and eaten ([12], p. 154).

A. pycnifolia, edible seeds ([26], p. 57; [21], p. 94).

A. salicina, seed ground and made into small loaves ([12], p. 157).

A. sentis, seeds used as food ([26], p. 57; [21], p. 94).

A. sophorae, seeds roasted in pods ([5], p. 16, T).

A. victoriae, seed pounded and made into loaves ([12], p. 157).

Adansonia Gregorii, Sour Gourd, Cream of Tartar Tree; seeds eaten raw, or baked and ground ([23]). Boabab Nuts, Tsimih; white kernels pounded, mixed with water, and eaten with meyers. Kimberleys ([14], p. 51).

Adenthera abrosperma (leguminosae), Gen-doo; shining red and black, very hard seeds, roasted on coals and kernels eaten; grows in sandy poor country from Gilbert to the coast ([11], S.A.; [21], p. 94, N.Q.).

Amorphias Mitchelli, seed used for damper ([illegible] 153–157).

Araucaria Bidwillii, Bunya Bunya or Bunya [illegible] seeds 2"–2½" [illegible], eaten raw when tender, sweet taste, roasted when [illegible] taste like roasted chestnuts; fattening; sometimes stored in waterholes for a month or two, then considered better after start of germination, pounded into a meal and supposed to induce cerebralism. Q.; large quantities eaten at tribal feasts. Aborigines sometimes travel far to reach these trees, which are divided between tribes and families, and handed down from generation to generation. Fruit is plentiful once in three years. In an area where trees were abundant, the government placed restrictions on felling, and trees preserved this area approximately 50 × 20 miles. The tree could be more extensively cultivated, owing to food value of seeds; wood of secondary importance. It was brought to Kew by Bidwell and first described by Sir Wm. Hooker ([5], p. 107; [29], pp. 93–94; [21], pp. 50, 115).

obtained ([16], p. 66, Q., N.S.W., V.). As far as camels are concerned, a variety of the Ice Plant, Parakylia (see *Portulaca*, above), is moist enough to be as good as water to them.

Edible Parts Unspecified

Brasenia peltata, plant considered nutritious in America, probably from its large-grained starch ([16], Q., N.S.W., V.).

Calandrinia polyandra, Cecanda; used as food by some W.A. tribes (Mueller and Forrest; [16], p. 17). It is widely distributed in C., W. and N.A.

Cassytha filiformis, Dodder Laurel, Devil's Guts; plant used by Brahmins of southern India for seasoning their buttermilk ([16], p. 14, Q., N.T.).

Eucarya acuminata, Wuti, Wulti ([13], p. 167).

Garcinia Mestoni, edible ([2], p. 397).

Hydnangium glabrellum, Wilitchua? eaten raw ([13], p. 170).

Lepidium Muelleri-Ferdinandi, cooked and eaten ([13], p. 154).

Livistona australis, Cabbage Tree, Kondo; edible ([21], N.S.W.). Aborigines eat heart of tree raw or cooked; small quantities not indigestible ([16], p. 40, V., Q.).

Marsdenia viridiflora (Asclepiad); edible.[21]

Mimusops parvifolia, tree yield thick milky sap like fresh cream ([16], p. 45, Q., N.T.).

Schizomeria ovata, edible ([2], p. 398).

Stenopetalum lineare, edible ([13], p. 159).

Typhonium Brownii, Arum; edible.[21]

Vitis hypoglauca, Native Grape, Gippsland Grape; could be improved by culture ([16], p. 66, V., N.S.W., Q.). (See also above, p. 132.)

Xanthorrhœa hastilis, edible.[21]

Zygophyllum fructicolosum, Medeewurta; eaten ([13], p. 159).

Z. glaucescens, eaten ([13], p. 159).

Ferns

The tops of the fern *Alsophila* are split open by Tasmanians who remove the pith, which is then roasted and eaten ([6], p. 16). In N.Q. the young growing point of *Alsophila Woollsiana* is roasted and eaten ([23], p. 9). The root of another fern, *Blechnum serrulatum*, is first roasted, scraped and cut up on a log with sharp stones, now ready to eat and called Bangwal (Brisbane tribe [22], p. 92; [23], p. 10). Roth[23] describes how the small rhizomes of *B. orientale* are first roasted, then hammered, before being eaten (N.Q.). A water fern known as Nardoo (*Marsilea quadrifolia*, contrary to general belief, was only used in times of drought, when seed was unobtainable. It was used in C.A., where no attempt was made to winnow the Seed other than removing the large husks. The whole was then ground up, mixed into a paste with water, and cooked in ashes ([10], p. 175). Another species similarly used as food in C.A. was *M. Drummondii* ([3], p. 104; [24], p. 14). Other authorities mentioning this use of water ferns (*Marsilea*) as food are ([21], p. 52; [1], p. 159; [12], p. 335).

Appendix 20 Wild Food in Australia by A. B. Cribb and J. W. Cribb: Sample Pages

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Wild Food

IN AUSTRALIA

A. B. & J. W. Cribb

Paintings by
CHARLES McCUBBIN

Collins
SYDNEY · LONDON

APPENDIX 20 (CONTINUED)

fruits are half eaten, to reveal the purple-red flesh.

We have found the fruits very unpleasant to eat raw, but they are said to yield a very fair jelly or preserve, frequently made in the country districts, where it is a prolific bearer. However, it was admitted that the frequent occurrence of maggots was a drawback.

The inner bark of one species, whose specific name was not recorded, was eaten by the Aborigines of the Maroochy district in Queensland.

Other species whose fruits were eaten by the Aborigines either raw or after roasting, are *P. [illegible]*, *P. [illegible]* and *P. [illegible]*.

Distribution: *P. [illegible]* – Qld, N.T. *P. [illegible]* – Qld, N.S.W. *P. [illegible]* – Qld. *P. [illegible]* – Qld, N.S.W. *P. [illegible]* – Qld, N.S.W.

Planchonia careya — COCKY APPLE

Cocky apple is a common tree of many eucalypt forests in areas extending north from a little south of Gladstone, Queensland. Its leaves [illegible] and [illegible] the flowers [illegible] the fruits [illegible] green [illegible] long and [illegible] the persistent calyx. [illegible]

Use of the fruits by the Aborigines seems to have varied from district to district. In the Gladstone area they are reported to have been eaten the whole fruit raw; another report states that the fruits were [illegible].

Distribution: Qld.

Pleiogynium timorense — SILVER QUEEN

Among the many fruits found from [illegible] to tropical [illegible] belongs to *P. [illegible]*. The [illegible] the remains of [illegible] white or cream, and consist of [illegible] segments [illegible] are eaten. [illegible] the fruits are small [illegible] but rather too aromatic to [illegible] in large amounts. It would be worth trying them in [illegible].

Distribution: Qld, N.S.W.

Pleiogynium timorense — BURDEKIN PLUM
P. solandri

This spreading tree with glossy, pinnate leaves bears purple-black fruits 3–4 cm broad, a little like flattened plums. The flesh around the large, ribbed stone is acid and of reasonable flavour only if completely ripe. Some have advocated burying the fruit for two days before eating. Captain Cook's party ate this fruit at the Endeavour R., and Banks's journal records that 'those which we gathered off from the tree were very hard and disagreeable but those which we kept for a few days became soft and tasted much like mulberries.' Dampier's. At one time this tree bore the name *Pleiogynium solandri* commemorating Daniel Solander of the *Endeavour*.

Distribution: Qld.

Podocarpus elatus — BROWN PINE

Brown pine is a common rainforest tree belonging to the same major group as the pines, but differing from most other members in having no obvious cone. At maturity, there is a single, round, greenish seed seated at the apex of a larger fleshy stalk which resembles a purple-black grape with a wax bloom. This fleshy stalk is edible but is rather mucilaginous and resinous in flavour. It has been described as 'amongst the best of the indigenous fruits' but we place it rather lower on the scale of excellence. We find jam or jelly more acceptable than the raw stalks, but the texture is stringy and mucilaginous.

Distribution: Qld, N.S.W.

Podocarpus spinulosus — NATIVE PLUM, NATIVE DAMSON

In some coastal areas, particularly in sandy places such as parts of the Gulbient country of Queensland, *P. spinulosus* is a common shrub. Its spreading branches may root where they touch the ground and so aid the formation of thickets. As with its relative of the rainforest, *P. elatus*, a round seed is borne at the apex of an edible, purple-red stalk-like structure. However, the very sharp, dagger-shaped leaves are a deterrent to the gathering of a fruit of rather doubtful quality.

Distribution: Qld, N.S.W.

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APPENDIX 20 (CONTINUED)

The whole plant, including the flowers but excepting the roots, can be cooked as a green vegetable. If served with butter, the latter provides most of the flavour, so a relevant dish is produced. As usual, young plants are more acceptable as older ones are inclined to be stringy. Distribution: All States

Gahnia SAW-SEDGE

The leaf-blades of some species of *Gahnia* plants have been recorded as being eaten by the Aborigines. The edible portion may be obtained from young as mature leaves are very tough and marine-edged. Distribution: Qld, N.S.W., Tas., N.T.

Hydrocotyle PENNYWORT

Species of *Hydrocotyle* have creeping stems and generally rounded leaves, some with or without scalloped margins, borne on long erect leaf-stalks. Many are plants of moist places such as creek banks and tidal margins in rainforests, but some tolerate fairly sunlight. In south-east Australia some species are found as green vegetables. The [illegible] *H. asiatica* and *H. [illegible]*. Both have a strong carrot-like taste and one should not want to eat them in large quantities.
Distribution: Some species in all states

*Hypochaeris glabra** SMOOTH CAT'S-EAR

Closely related to the following species, the smooth cat's-ear is distinguished by its hairless leaves, and by the larger flower-heads with long flower-stalks. This weed also is an introduction from Europe, and like its relative is common in many parts of Australia. The young leaves may be used in the same ways as those of *H. radicata*.
Distribution: All States

*Hypochaeris radicata** CAT'S-EAR, FLAT-WEED

To many people this common weed of lawns and pastures is known as dandelion, which it resembles in general appearance and in its bright yellow flower-heads. Botanically they may be distinguished by the presence of chaff scales amongst the tiny florets in the head of *H. radicata*, and by the branched feathery structure of the hairs on the wind-borne fruits. In dandelion there are no

chaff scales, and the soft bristles of the fruits are simple, not feathery. A simple distinction is that cat's-ear usually has branched flower stems with several heads, while in dandelion heads are always borne singly. Both produce a white milky sap when stems, leaves or flowers are broken.

Leaves of cat's-ear may be used in the same way as those of dandelion and are less bitter. Although rather undistinguished in taste they may be found useful as they are usually available in large quantities along roadsides and in open grassed areas. Use young leaves only. Distribution: All States

Lactuca serriola PRICKLY LETTUCE, COMPASS PLANT

One of the yellow-flowered milky thistles, this species of *Lactuca* is related to, and possibly an ancestor of, the cultivated lettuce. In general appearance it is rather similar to the sow thistle but narrower and with the prickly leaves tending to be orientated in one plane, for which reason it is sometimes known as compass plant. The latin name *L. virosa* refers to the milky juice exuded when any part of the plant is broken or cut.

Young fresh stems and unopened flower-heads can be used raw in salads or cooked as a green. Although [illegible] is dependent on the condition of the specimens used, it is of great importance – best if growing in fertile soil and in a fresh state will be found most acceptable, while stunted, old or wilted material is not worth the trouble of cooking.
Distribution: All States

*Lepidium spinosum** PEPPERCRESS

A common weed around cultivation in warmer parts of Australia and the peppercress. From the other cresses it may be distinguished by its minute flowers with petals shorter than the sepals, and by its very short pods. It has been used raw as a cress, and also may be cooked, but, however, a coarser and less succulent plant than the other cresses. In some related northern American species the pods, which are peppery in flavour, are used as a seasoning in soups and salads.

Peppercress is regarded as an undesirable weed in dairying districts because of its reputation for tainting milk.
Distribution: Qld, N.S.W.

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