PRELIMINARY ETHNOBOTANICAL SURVEY OF KURUPUKARI: AN AMERINDIAN SETTLEMENT OF CENTRAL GUYANA[1]

MARK JOHNSTON AND ARAMINTA COLQUHOUN

Johnston, Mark *and* **Araminta Colquhoun** *(School of Interdisciplinary Science, University of the West of England, Coldharbour Lane, BRISTOL BS16 1QY).* PRELIMINARY ETHNOBOTANICAL SURVEY OF KURUPUKARI: AN AMERINDIAN SETTLEMENT OF CENTRAL GUYANA. *Economic Botany 50(2):182–194, 1996. A preliminary assessment of the utilization of plant species was undertaken within an Amerindian community at Kurupukari, Guyana. A total of 120 plant species of 46 plant families, covering 246 different plant uses were identified. Plant uses were divided into six utilization categories; 64 species for medicinal, 53 for technological, 43 edible, 20 for timber, 14 for construction and two species with miscellaneous uses. Of the 120 plant species, one species was recorded with five different use categories, two with four and 13 with three. A further 23 species were identified as having multiple uses. Of the 20 commercial timber species, five species were also shown to exhibit some form of non-timber product use, emphasising the under-utilization of species extraction. The dual extraction of both timber and non-timber resources from the same tree as a more effective sustainable utilization of available forest resources is also discussed.*

La Etnobotanica de los Kurupukari de Guyana. *Se emprendió un estudio inicial del aprovechamiento de especies de plantas en un pueblo amerindio a Kurupukari (Guyana). Un total de 120 especies de 46 familias de plantas fueron identificadas que abarcaron 246 aprovechamientos distintos de las plantas. Los aprovechamientos de las plantas fueron divididos en seis categorias de uso: 64 especies tienen usos medicinales y 53 tecnológicos, 43 se consideran comestibles, 20 sirven para maderas, 14 para la construcción y 2 se aprovechan para usos varios. Entre las 120 especies de plantas, una fue registrada en cinco de las categorías de uso, dos fueron registradas en cuatro y 13 en tres. Otras 23 especies fueron identificadas como plantas de aprovechamientos múltiples. Se puso de manifiesto que entre las 20 especies aprovechadas para la producción de maderas, cinco se aprovechan también para algún uso distinto, lo que destaca la infrautilización de la extracción de las especies. Se comenta también la explotación más sostenible de los recursos forestales disponibles que puede resultar de la doble extracción del mismo arbol de recursos tanto de madera como de otro tipo.*

Key Words: non-timber forest products; dual extraction; ethnobotany; Guyana.

Much interest has now developed regarding the potential utilization of non-timber or minor forest products (Gentry 1993; Prance 1990). The documentation of the utilization of plant resources by local people needs to be prioritised. Elisabetsky and Shanley (1994) recognized that only 20 of the 122 Amerindian groups within Brazil have been ethnobotanically studied, and not all of these in detail. Ethnobotanical studies not only identify products which may have local or national commercial value (Plotkin and Famolare 1990), but more importantly they provide a framework for the integration of such knowledge into development initiatives (Martin 1995), and identification of key habitats for conservation (Campbell 1994). In terms of useful products from tropical forests many may meet a local demand, but only a small proportion of utilizable products are ever likely to reach any form of commercial exploitation or marketing potential, and even fewer on a sustainable basis (i.e., sustained population growth of the resource and of the species, and resources dependent on the harvested resource).

More than 119 medicinal compounds, and over 25% of commonly used drugs are extracted from higher plants (Farnsworth 1988), and with the increase in knowledge of medicinal plant species (Joyce 1991), the extraction and isolation of medicinal compounds from plant popu-

[1] Received 6 April 1995; accepted 30 January 1996.

lations on a sustainable basis, may appear the most economically viable method of non-timber resource harvesting. However, relatively little documented information exists on traditional medicinal plants, their active compounds and economic value (Balick and Mendelsohn 1992), and probably even less information on whether their extraction could be ecologically viable.

Regarding the conservation of tropical biological diversity, new policies and ideas have been proposed to make areas of high biodiversity or conservation importance economically productive (Ehrlich and Wilson 1991), providing an actual value to the forests. Recently Holdgate (1994) emphasized that we need to 'rediscover their [Amerindian] wisdom' in order to understand the principles of sustainable development. These needs may be applied advantageously through techniques such as Participatory Rural Appraisal and Rapid Ethnobotanical Assessments (Martin 1995), allowing the integration of ethnobotanical knowledge into conservation initiatives. Still little experimental research has been undertaken to test the economic and conservation validity of the successful management of 'economic forests,' whether harvesting forest fruits, medicines, dyes, oils, timbers or craft products. Even though priority areas for conservation based on floristic diversity have been recognized in the neotropics (Prance 1995), the integration of this with ethnobotanical knowledge is only just being formulated (Campbell 1994), although many areas within the neotropics remain ethnobotanically undocumented (Elisabetsky and Shanley 1994; Schultes 1992). Here we present a preliminary assessment of the utilization of plant resources by a single Amerindian community within a high priority conservation area, which to date has been poorly documented for its ethnobotanical knowledge.

Methodology and Study Area

Results presented here were obtained from a small Amerindian settlement at Kurupukari (4°34′51″N, 58°42′48″W) in central Guyana. The settlement comprised of 65 adults of mixed Amerindian origin (Arawak, Wapasiana and Macushi). Ethnobotanical information was collected through the use of 1-ha forest plots (Johnston and Gillman 1995) and the 'walk-in-the-woods' technique used, whereby individual Amerindians were walked around the forest plots and asked to identify those plants used (Prance et al. 1987). Information was also collected on a day to day basis by collecting fertile plant specimens and identifying their uses and local names with elders from the village. Unlike many Amerindian settlements in South America, none of the plant species from Kurupukari were sold in local markets, and therefore hold no local commercial value.

Specimens were identified with reference to herbarium material held at the University of Guyana and the Royal Botanic Gardens, Kew, where the collection is currently housed. A full list of specimens identified and there respective voucher collection numbers are given in the appendix. Specimens were also cross-referenced by comparing the Amerindian names with the published work of Mennega, Tammens-de-Rooji, and Jansen-Jacobs (1988) and Roosemalen (1986). All species were then categorized in accordance with Prance et al. (1987) and divided into six use categories, thus;

Edible (E)
: Species which may be consumed, including fruits, nuts, beverages and spices.

Technological (Te)
: Species used for general local use, including tools, varnishes, fish poisons, resins and craft fibres.

Commercial timber (T)
: Timber species with known commercial use.

Construction (C)
: Species used in the construction of Amerindian dwellings.

Medicinal (M)
: Species used to treat illnesses.

Miscellaneous (Mi)
: Other items which may be categorized in the above, include decorations and perfumeries.

A "finer-grain" classification of plant utilization was also used. The number of species and the number of species per use category, and the number of uses per species was then documented.

The information presented here is the first ethnobotanical survey from this study area of the Commonwealth Secretariat–Guyana Government International Iwokrama Rainforest Programme (Hawkes and Wall 1993). A programme first initiated in 1990 to investigate the sustain-

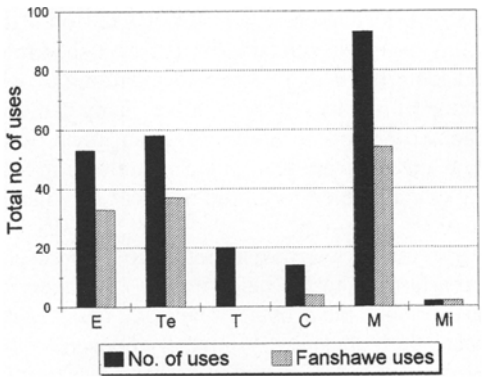

Fig. 1. Total number of uses in accordance with six use categories (Prance et al. 1987) for studies undertaken at Kurupukari and those by Fanshawe (1948a). E—Edible; Te—Technological; T—Timber; C—Construction; M—Medicinal; Mi—Miscellaneous.

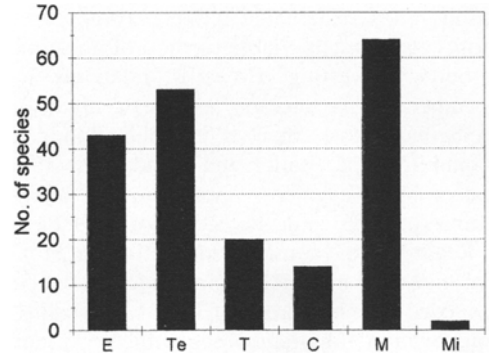

Fig. 2. Number of species identified at Kurupukari within each of the six use categories.

able utilization of tropical forests. Details on the floristic composition and stand structure, and the 1-ha non-timber forest inventory of the forests surrounding Kurupukari are presented elsewhere (Johnston and Gillman 1995).

The ethnobotanical results obtained from this survey of one Amerindian settlement were then compared with the national survey undertaken by Fanshawe (1948a). The plant uses recognized by Fanshawe were re-assessed using plant use categories described by Prance and co-workers (1987). Although Fanshawe did not specify the methods or geographical region used in his study, the work still stands as the most comprehensive review of the utilization of non-timber forest products in Guyana, and acts as a most useful comparison.

Results

A total of 120 species (a further ten species identified to plant family only) were recorded during the survey (see Appendix). From these species, 246 different plant uses were identified by the local people, with plants being used for medicinal purposes representing the largest proportion of different uses (39.4%), followed by technological and edible uses (23.5 and 22.3% respectively, see Fig. 1). A similar pattern was recorded for the number of species represented within each of the five utilization categories (Fig. 2).

Plants used for medicinal purposes also represented the largest number of uses per species, with five different uses recorded for one species (*Mikania hookeriana* Asteraceae) and four uses for two species (*Humiria balsamifera* Humiriaceae; *Pentaclethra macroloba* Mimosaceae). However, the majority of species (46.2, 84.4 and 56.3% for the three different categories in which more than one category could be recorded) were known for only one use per category (Fig. 3).

Eighty of the 130 species were recognized as occurring within only one of the six different utilization categories. No one species was found in all six categories, although one species (*Maurita flexuosa* Arecaceae) was recorded within five of the six categories, two species in four categories and 13 in three categories (Fig. 4). In a 'finer grain' plant categorization of 46 different plant use categories, edible fruits were represented as being the most important, with 34 different edible plant species recognized. The most commonly recognized medicinal use of

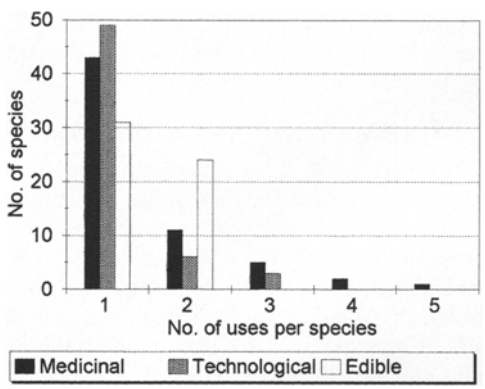

Fig. 3. Number of species by the number of different uses per species for medicinal, technological and edible categories.

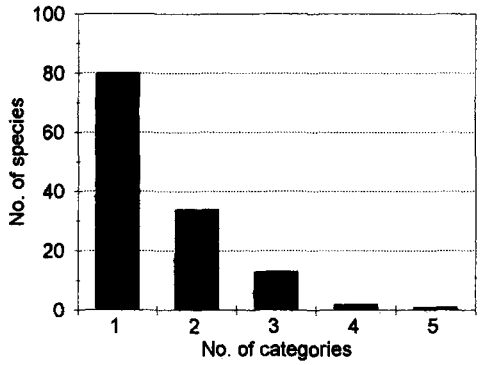

Fig. 4. Frequency distribution of the number of species represented in one to five different use categories, i.e., 80 species were found in only one use category, and no species found in more than five categories.

plants was in the treatment of skin ulcers and sores from 17 different species, followed by malaria from 11 species, dysentery and snake bite cures with equal six different plant species (Fig. 5). Eighteen of the 46 categories were represented by a single plant species (a mean of 4.95 species per category), ranging from sweat inducers to perfumeries.

In comparing the utilization of forest products at Kurupukari with that of Fanshawe (1948a) similar trends may be observed. Fanshawe identified 222 species (only those identified to species included), of which edible species were the largest category with 149 different species, followed by 123 technological species and 110 medicinal species. The number of species listed by Fanshawe used for construction were surprisingly low with only seven species listed in all ex-

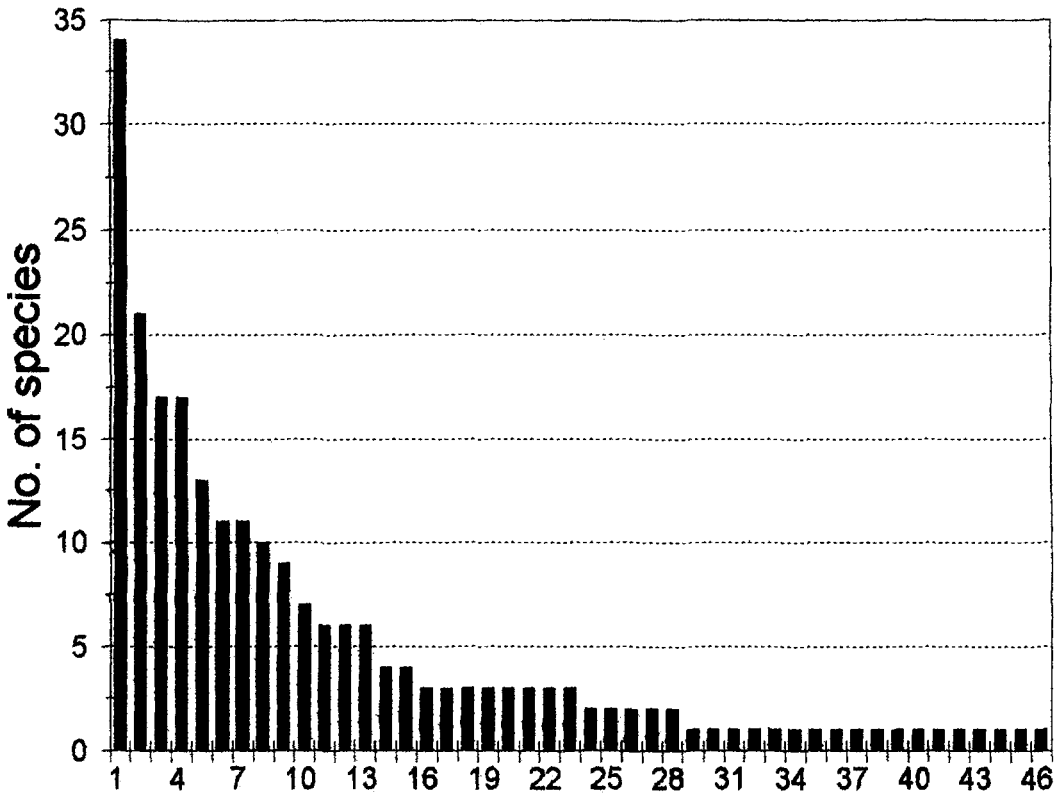

Fig. 5. Frequency distribution of the number of species represented within 46 fine-grain use categories. 1. Edible fruits, 2. Commercial timber, 3. Skin ulcers/sores, 4. Craft fibres, 5. Edible Oils, 6. Malaria, 7. House construction, 8. Fish poison, 9. Flavourings, 10. Tools and timber artefacts, 11. Dysentery, 12. Snake bites, 13. Dyes, 14. Diarrhoea, 15. Coughs, 16. Worms, 17. Wounds/cuts, 18. Sore eyes, 19. Lung problems, 20. Sudorific, 21. Tannins, 22. Soap, 23. Latex, 24. Insect bites, 25. Tooth ache, 26. Urino-genital, 27. Varnishes, 28. Decoration, 29. Sweat inducer, 30. Rheumatism, 31. Pain killer, 32. Smallpox, 33. Liver problems, 34. Skin yaws, 35. Ringworm, 36. Waterproofing saps, 37. Resin, 38. Insecticides, 39. Colds, 40. Typhoid, 41. Ear infections, 42. Measles, 43. Tumors, 44. Perfumary, 45. Indigestion, 46. Febrifuge.

TABLE 1. IDENTIFICATION OF KEY SPECIES WORTHY OF FURTHER INVESTIGATION FOR POTENTIAL UTILIZATION. T - TIMBER; M - MEDICINAL; TE - TECHNOLOGICAL; E - EDIBLE.

a) Timber species with more than one additional utilization.	b) Multi-use species (three or more different uses).	
Carapa guianensis (T, Te and M)	*Anacardium giganteum*	*Lecythis zabucajo*
Jacaranda copaia (T and M)	*Astrocaryum aculeatum*	*Licania alba*
Lecythis zabucajo (T, E and M)	*Carapa guianensis*	*Maximiliana regia*
Licania alba (T, M and Te)	*Cecropia sp.*	*Manilkara bidentata*
Mora excelsa (T, Te and M)	*Cocos nucifera*	*Mauritia flexuosa*
	Dipteryx odorata	*Mikania hookeriana*
	Duguetia neglecta	*Mora excelsa*
	Eperua falcata	*Oecocarpus bacaba*
	Euterpe oleracea	*Pentaclethra macroloba*
	Genipa americana	*Phytolacca rivinoides*
	Humiria balsamifera	*Tabernaemontana undulata*
	Jacaranda copaia	

cept one belonging to the Arecaceae. This low listing may be due to the inclusion of traditional Amerindian construction material as 'major forest products' (Fanshawe 1948b), rather than "minor." At Kurupukari, 42 useful species were identified which were not listed by Fanshawe (1948a). Moreover, Fanshawe does list eleven species with different uses to those which were recognized at Kurupukari. In terms of the number of uses for species collected at Kurupukari, Fanshawe recognized 60% of the species with edible products, 63% as technological, 28% for construction and 55% for medicinal (see Fig. 1).

DISCUSSION

Initial surveys would suggest that the Kurupukari forests hold a diverse availability of non-timber forest products. Whether any of these plant species could be extracted to treat different diseases, cultivated for fruit production or harvested for natural oils is yet to be investigated, however, predictions may be made on those species which are of particular interest.

All the timber species identified by the Amerindians were already recognized timber species, and are being used at some level of exploitation (Danks 1945). Five of the 20 timber species were identified with more than one additional non-timber use; medicinal, technological or edible (Table 1, part a). A further 23 species were identified as multi-use non-timber species, where three or more different uses were recognized for a given species (Table 1, part b). This signifies current under-utilization of potentially available resources, i.e., the extraction of non-timber forest products simultaneously with that of timber could be considered, or the extraction of more than one non-timber forest products at any given time.

The sustainable extraction of these timbers, and the added harvesting of non-timber products from tree species within the same forest area, could greatly increase the commercial value of these species and forests alike. However, information on the methodology required in order to extract non-timber products on a sustainable basis is lacking. It may be possible that the additional extraction costs of non-timber product removal may not be significantly greater than for the extraction of timber, as well as providing sufficient quantities of medicinal raw material (which has been one main drawback for the development of tropical medicines, Farnsworth 1988). Such dual harvesting could be of major conservation value by increasing the economic value of the forests per unit area, whereby the extraction of timber from a particular area may be reduced (as the economic value of the forests may be increased), and therefore increase the sustainability potential for a given area. However, further studies are obviously required on the ecology of the resources, the potential commercial value and mechanisms for the dual sustainable extraction of timber and non-timber products.

Of the 64 species found with medicinal properties, 13 of these were used solely for the treatment of fever or malaria. Although further research may be of interest to isolate any potential active compound, it is unlikely that these 'ma-

larial' species have any commercial value, other than possible local use. Species which may have commercial value, however, include those used for skin irritations, bites, skin sores and ulcers, anti-cancer, and treating sore eyes. Species, such as these, may have commercial potential under one or more conditions, (i) the species yields a particular product which may be shown to be a more effective treatment compared to that of existing drugs; (ii), a species product which is easier or cheaper to extract and produce than current commercial drugs, or (iii), a species product being sold as an effective alternative while contributing towards rainforest conservation.

Regarding technological products, limited commercial potential other than on a local scale may be envisaged (Fanshawe 1948a). However, craft products, such as Mibi (*Philodendron jenmani*), Yarula (*Aspidosperma oblongum*), Kupa (*Clusia grandiflora*) Kakoralli (*Eschweilera* sp.), Leopardwood (*Brosimum guianense*) and species of Arecaceae do have a potential commercial value through traditional crafts, producing a local income, and with the potential to develop outside commercial value with the export of such crafts. The number of species which produce dyes or tannins is relatively limited, although commercial extraction might be considered, notably for products which may be extracted with the timber (e.g., Crabwood *Carapa guianensis*).

A wide range of species produce fruits which may have some commercial value. Fruit or nut bearing species include Balata (*Manilkara bidentata*), Asepoko (*Pouteria guianensis*), Komaramara (*Duroia* sp.), Lana (*Genipa americana*), Sawari (*Caryocar nuciferum*), Monkey Pot (*Lecythis zabucajo*), several species of Palm fruits, and Wild Cherry (*Eugenia patrisii*). Although some of these species may be harvested from the forests, it is unlikely that such harvesting could produce sufficient quantities, or quality of fruit to meet commercial demands. Further research is required in order to consider whether such populations may be harvested from the forests in conjunction with other timber and/or non-timber products. Preliminary assessments have already provided valuable insights into such potentials (Phillips et al. 1994). The potential for fruit harvesting may rely upon the frequency of fruiting (synchronous/asynchronous), harvestability, and the distribution and abundance of fruiting trees. Research is also required into the cultivation and propagation potential of these species to meet commercial market requirements.

Several tree species produce oils of high quality, and may offer a good opportunity for commercial exploitation. Species identified from this study which produce such oils include, Sawari nut oil, Monkey Pot nut oil, Tonka Bean seed oil (*Dipteryx odorata*) with an estimated $US1600 per ton of seed (1979 prices), Maran (*Copaifera* sp.) oil ($US660 per ton of oil) and varnish (Prance 1990), and Crabwood ($US40.0 per ton of kernel). Commercial prices are from Balick (1985).

Conclusion

Ethnobotanical studies provide a valuable insight into the potential utilization of species. Such information may be used to identify particular species worthy of further investigation, while contributing towards the local and national sustainable exploitation of non-timber products and biodiversity databases. An ethnobotanical survey is only the preliminary stage to investigating the potential exploitation of forest products, and a series of research objectives must be considered before the actual economic and conservation value of non-timber resources may be developed. To positively identify any commercial potentials it is essential not only to undertake chemical analysis and the isolation of active compounds, carry out market research and assess processing problems. Ecologically, it is essential to obtain detailed information on the dynamics of the resource to be removed, notably population or resource recovery rates, biotic and abiotic conditions for population growth, as well as baseline data on the abundance and distribution of available resources. The sustainability of the resource obviously needs investigating, notably the impact of resource removal on other species or resources, and tests for suitable extraction or harvesting techniques. Horticultural research is also required into the cultivation and propagation techniques required to harvest a particular resource sustainably and to investigate any potential pest problems. Only through the interaction of these objectives can the actual economic viability of such timber and non-timber resources be realised.

Acknowledgment

We are indebted to the Amerindians of Kurupukari, particularly Capt. David Andries, Clinton Jefferies and Augustine Andries. Also to GAHEF

for permission to undertake these studies, Conrad Gorinsky for initial discussions on the project and Mike Gillman for contributions towards the manuscript. MAJ was supported by an Open University Post-doctorate fellowship.

LITERATURE CITED

Balick, M. J. 1985. Useful plants of Amazonia: A resource of global importance. Pages 339–368 *in* G. T. Prance and T. E. Lovejoy, eds., Amazonia key environments. Pergamon Press, Oxford.

———, **and R. Mendelsohn.** 1992. Assessing the economic value of traditional medicines from tropical rain forests. Conservation Biology 6:128–130.

Campbell, D. G. 1994. Scale and patterns of community structure in Amazonian forests. Pages 179–199 *in* P. J. Edwards, R. M. May, and N. R. Webb, eds., Large-scale ecology and conservation biology. Blackwell Scientific Publications, London.

Danks, F. S. 1945. Notes of the British Guiana Timbers. Timehri. 45:4–28.

Ehrlich, P. R., and E. O. Wilson. 1991. Biodiversity studies—Science and policy. Science 253:175.

Elisabetsky, E., and P. Shanley. 1994. Ethnopharmacology in the Brazilian Amazon. Pharmacology and Therapeutics 64:201–214.

Fanshawe, D. B. 1948a. Forest products of British Guiana. Part II: Minor forest products. Forestry Bulletin, British Guiana no. 2.

———. 1948b. Forest products of British Guiana. Part I: Major forest products. Forestry Bulletin, British Guiana no. 1.

Farnsworth, J. D. 1988. Screening plants for new medicines. Pages 83–97 *in* E. O. Wilson, ed., Biodiversity. National Academy Press, Washington.

Gentry, A. H. 1993. Tropical forest biodiversity and the potential for new medicinal plants. ACS Symposium 534:13–24.

Hawkes, M., and J. R. D. Wall. 1993. The Commonwealth and Government of Guyana Rain Forest Programme, Phase I, Site Resource Survey, Main Report. Chatham, UK. NRI.

Holdgate, M. 1994. Ecology, development and global policy. Journal of Applied Ecology 31:201–211.

Johnston, M. A., and M. P. Gillman. 1995. Species composition and stand structure in low-diversity forests. Biodiversity and Conservation 4:339–362.

Joyce, C. 1991. Prospectors for tropical medicines. New Scientist 19 October: 36–40.

Martin, G. 1995. Ethnobotany. A people and plants conservation manual. Chapman and Hall, London.

Mennega, E. A., W. Tammens-de-Rooji, and M. Jansen-Jacobs. 1988. Checklist of woody plants of Guyana. TROPENBOS public.

Phillips, O., A. H. Gentry, C. Reynel, P. Wilkin, and C. Galvez-Durand. 1994. Quantitative ethnobotany and Amazonian conservation. Conservation Biology 8(1):225–248.

Plotkin, M., and L. Famolare. 1990. Sustainable harvesting and marketing of rain forest products. Conservation International. Island Press.

Prance, G. T. 1990. Fruits of the rainforest. New Scientist 13 January: 42–45.

———. 1995. A comparison of the efficacy of higher taxa and species numbers in the assessment of the biodiversity in the neotropics. Pages *–* *in* D. L. Hawksworth, ed., Biodiversity: Measurement and estimation. Chapman and Hall public, London.

———, **W. Balee, B. M. Boom, and R. L. Carneiro.** 1987. Quantitative ethnobotany and the case for conservation in Amazonia. Conservation Biology 1:296–310.

Roosmalen, van M. G. M. 1984. Fruits of the Guianan flora. Institute of Systematic Botany, Utrecht University.

Schultes, R. E. 1992. Ethnobotany, biological diversity and the Amazonian Indians. Environmental Conservation 19(2):97–100.

APPENDIX 1. INVENTORY OF PLANTS USED BY AMERINDIANS AT KURUPUKARI, GUYANA, COMPARED WITH NATIONAL SURVEY BY FANSHAWE (1948A). VERNACULAR NAMES USED BY AMERINDIANS AT KURUPUKARI ARE A COMBINATION OF CREOLE (C) AND ARAWAK (A), THE ORIGIN OF SOME PLANT NAMES ARE UNKNOWN AND SOMETIME USE A COMBINATION OF ARAWAK AND CREOLE (A/C); FURTHER DETAILS ARE GIVEN IN MENNEGA AND COWORKERS (1988).

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
Anacardiaceae	*Anacardium giganteum* H ex. Engl.	Cashew (C)	Obs.	Edible fruits and oils. varnish and treating diarrhoea	2	1			1		2	1		1
	Tapirira marchandii Engl.		23-92	Edible berries, treating ulcers	1				1					
Annonaceae	*Annona sericea* Dunal.	Wild soursop (C)	Obs.	Edible fruits	1						1			
	Duguetia neglecta Sandw.	White Yarri-yarri (A/C)	66-92	House construction timbers, cough remedy, fibres from bark		1		1	1					
	Guatteria ovalifolia R.E. Fries	Black Yarri-yarri (A/C)	107-92	House construction timbers				1						
	Rollinia exsucca A.DC.	Black Maho (C)	44-93	Edible fruits	1									1
	Xylopia sp.		Obs.	Flavourings, treating dysentry and di-arrhoea	1				2					2
Apocynaceae	*Aspidosperma oblongum* A.DC.	Yarula (A)	08-92	Craft wood e.g. paddles		1								
	Couma guianensis Aubl.	Star Apple (C)	Obs	Edible fruits. locally used latex	1	1								
	Odontadenia macrantha Markgr.		134-93	Latex		1						1		
	Odontadenia nitida Muell. Arg.		Obs.	Food flavouring	1									
	Tabernaemontana undulata Vahl.	Dogwood (C)	106b-92	Soothe bites, irritations of the skin, snake bite wounds					3					2
Asteraceae	*Clibadium sylvestre* Baill.	Cunami (A)	Obs.	Fish poison		1								
	Mikania hookeriana DC.	Bitter Tally (C)	100-92	Malaria, snake bites, syphilis, skin ulcers and indigestion					5					3
Bignoniaceae	*Jacaranda copaia* (Aubl.) D. Don.	Phootee (A)	Obs.	Commercial timber, treating skin sores and ulcers			1		2					
	Tabebuia insignis Sandw.	White cedar (C)	Obs.	Skin diseases					1					1
Bombacaceae	*Bombax flaviflorum* Pulle	Wild Silk Cotton (C)	166-93	Kapok fibres		1						1		
	Catostemma fragrans Benth.	Baromalli (A)	102-92	Commercial timber, bark used in dressing yaws			1		1					
Boraginaceae	*Cordia exaltata* Lam.	Table Tree (C)	57-93	Glues		1								
	Cordia nodosa Lam.	Maho (A/C)	09-92	Edible fruits	1									

APPENDIX 1. CONTINUED.

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
Burseraceae	*Protium guianense* March.	Haiwa (A)	22-93	Waterproofing sap, purging the stomach		1			1					1
	Protium sagotianum March.	Haiwa (A)	07-90	Edible fruits	1						1	1		
	Trattinnickia sp.		Obs.	Emetic and sudorific					2					
Caesalpiniaceae	*Bauhinia kunthiana* Vogel	Turtle ladder (C)	Obs.	Fish poison and treating malaria		1			1					
	Campsiandra comosa Benth.	Apikara (A)	125-93	Treating dysentery					1		1			1
	Eperua falcata Aubl.	Soft Wallaba (C)	199-92	Resins, treating ulcers, sores and dysentery		1			3			1		3
	Mora excelsa Benth.	Mora (A)	107-93	Commercial timber, tannins and treating skin, worm and urino-genital infections		1	1		3		1	1		2
	Peltogyne sp.	Purpleheart (C)	Obs.	Commercial timber			1							
Caryocaraceae	*Caryocar microcarpum* Ducke	Bat Sawari (C/A)	126-93	Edible nuts and use as fish poison	1	1						1		
	Caryocar nuciferum L.	Sawari (C/A)	Obs.	Edible nuts and oils	2						2			1
Cecropiaceae	*Cecropia* sp.	Congo Pump (C)	Obs.	Tea from leaves and healing sores, cuts and skin problems	1				3		1			2
Celastraceae	*Goupia glabra* Aubl.	Kabukalli (A)	19-92	Commercial timber, bark for soothing toothache			1		1					1
Chrysobalanaceae	*Chrysobalanus icaco* L.	Fat pork (C)	Obs.	Edible oils and fruits	2						2	1		
	Licania alba Cuatr.	Brown Kaunta (C/A)	03-92	Commercial timber, varnishes and treating skin ulcers		1	1		1			1		1
	Licania heteromorpha Benth.	Kairiaballi	11-92	Treating diarrhoea					1					1
	Licania persaudii Fanshawe & Maguire	White Kaunta (C/A)	04-92	Cough remedy					1					
	Parinari campestris Aubl.	Bohorada (A)	Obs.	Edible fruits and flavourings	2									1
	Parinari parvifolia Sandw.	Bohorada (A)	83-92	Treating snake bites					1					
Clusiaceae	*Clusia grandiflora* Splitg.	Kupa (A)	Obs.	Craft fibres and sap used to remove botfly larvae		1			1			1		
	Tovomita obovata Engl.	Awasokule (A)	165-93	Dyes and sap used to remove botfly larvae		1			1					
	Vismia guianensis Choisy	Bloodwood (C)	Obs	Dyes		1						1		

APPENDIX 1. CONTINUED.

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
Dichapetalaceae	*Tapura guianensis* Aubl.	Karoshiri (A)	65-92	House timber construction and fish poison		1		1				1		
Ebenaceae	*Diospyros guianensis* Guerke	Powis eye (C)	66-93	Febrifuge					1					
Flacourtiaceae	*Ryania speciosa* Vahl.	Kibihidan (A)	Obs.	Insecticide		1						1		
Gentianaceae	*Irlbachia alata* Maas	Wild Tabaco (C)	119-92	Malaria					1					
Gnetaceae	*Gnetium* sp.		Obs.	Edible kernels and craft fibres	1	1								
Humiriaceae	*Humiria balsamifera* Aubl.	Taurniro (A)	Obs.	Commercial timber, treating dysentery, smallpox, skin ulcers and coughs			1		4			1		3
Icacinaceae	*Emmotum fagifolium* Desv. ex Hamilton	Manobodin (A)	120-93	Commercial timber and treating skin ulcers			1		1					1
Lauraceae	*Chlorocardium rodiaei* Rohwer, Richter & van der Werff	Greenheart (C)	125-92	Commercial timber, and treating malaria			1		1					1
	Licaria cayennensis Kosterm.	Wabaima (C)	136-93	Commercial timber			1							
	Ocotea canaliculata Mez	Silverballi (C)	114-92	Timber			1							
	Ocotea oblonga Mez	Kereti (A)	21-92	Timber			1							
	Ocotea wachenheimii Benoist	Kereti (A)	116-92	Timber			1							
	Ocotea sp.		Obs.	Timber			1							
Lecythidaceae	*Couratari guianensis* Aubl.	Wadara (A)	103-92	Craft fibres		1						1		
	Eschweilera sagotiana Miers	Black Kakoralli (C/A)	7-92	Craft fibres		1						1		
	Eschweilera sp.	Kakoralli (A)	127-92	Craft fibres		1						1		
	Lecythis zabucajo Aubl.	Monkey Pot (C)	Obs.	Commercial timber, edible nuts essential oils, and treating liver problems	2		1		1		2	1		
Loganiaceae	*Strychnos* sp.	Curarine A	Obs.	Curare Poison		1						1		
Malpighiaceae	*Byrsonima aerugo* Sagot	Sour pear (C)	162-93	Edible fruits and treating snake bites	1				1					
	Stigmaphyllon sinuatum Adr. Juss.	Karia (A)	81-92	Treating measles and sore eyes					2					1
Marcgraviaceae	*Norantea guianensis* Aubl.	Karakara (A)	106-93	Treating ulcers and sores					2					2
Melastomataceae	*Bellucia grossularioides* Triana	Bell apple (C)	Obs.	Edible fruits	1						1			
	Henriettea multiflora Naud.	Itaro (A)	139-93	Red dyes		1								
Meliaceae	*Carapa guianensis* Aubl.	Bulletwood (C)	Obs.	Commercial timber, tannins, commercial oils, soap and treating bites, diarrhoea and rheumatism		2	1		3			3		2

APPENDIX 1. CONTINUED.

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
Menispermaceae	*Abuta obovata* Diels		Obs.	Edible mesocarp and treating back pain	1				1					
Mimosaceae	*Desmodium canum* Schinz & Thellung	Iron weed (C)	103-93	Medicinal tea					1					
	Inga sp.	Whytie (A)	59-93	Some with edible mesocarp	1						1			
	Pentaclethra macroloba Kuntze	Trysil (A)	05-90	Oils, soap and extracts used for treating cuts, sores, asthma and bronchitis		1			4		1	2		2
	Pithcellobium cauliflorum Mart.	Alikya (A)	141-92	Commercial timber			1							
	Pithcellobium jupunba Urb.	Huruasa (A)	80-92	Soap extracted from the bark and anti-parasitic properties		1			1					1
Monimiaceae	*Siparuna guianensis* Aubl.	Fever Bush (C)	101-93	Treating malaria and colds					2					1
Moraceae	*Brosimum guianense* Huber	Leopard-wood (C)	65-93	Making bows and wood crafts		2								
	Brosimum rubescens Taub.	Dukaliballi (A)	65b-93	Treating dysentery					1					
	Ficus mathewsii Miq.	Kumakaballi (A)	Obs.	Latex for plaster		1								1
	Ficus sp.		95-93	Housing material and edible fruits	1			1						
Myrtaceae	*Eugenia patrisii* Vahl	Wild Cherry (C)	Obs.	Edible fruits	1						1			
	Marlierea guildingiana Krug & Urb.		61-92	Edible fruits	1									
	Myrciaria vismeifolia O. Berb	Taparau (A)	152-93	Edible fruits and housing material	1			1			1			
	Myrcia sp.		97-93	Tools, e.g. axe handles		1								
Papilionaceae	*Clathrotropis brachypetala* Kleinh.	Aromata (C)	45b-92	Fish poison and treating snake bites		1			1			1		1
	Copaifera sp.	Maran (A)	Obs.	Edible oils and anti-coagulant		1			1					1
	Diplotropis purpurea Amsh.	Tatabu (A)	Obs.	Commercial timber			1							
	Dipteryx odorata Willd.	Tonka bean (C)	Obs.	Edible nuts and oils, tannins, perfumery, used as food flavouring, and treating sore throats	2	2			1	1	3	2		1
	Mucuna urens DC.	Horse's eye (C)	Obs.	Treating intestinal worms					1					1
	Ormosia coutinhoi Ducke	Lucky seed (C)	159b-93	Decorative seed, to induce sweating and treat rheumatism					2					2

APPENDIX 1. CONTINUED.

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
	Sclerolobium guianense Benth.		14-92	Commercial timber and local crafts		1	1							
	Swartzia leicocalycina Benth.	Wamara (A)	67-93	Commercial timber			1							
	Swartzia leiogyne Cowan	Itikiboroballi (A)	Obs.	Suderific					1					
	Vateirea guianensis Aubl.	Arisauro (A)	Obs.	Treating wounds and ringworm					2					1
Phytolaccaceae	*Phytolacca rivinoides* Kunth & Bouche	Deer Callalo (C)	Obs.	Edible leaves, dyes, treating rabies, lung diseases and tumors	1	1			3			1		3
Rubiaceae	*Cinchona sp. (I)*		Obs.	Malaria					1					
	Duroia genipoides Hook. ex K. Schum	Komaramara (A)	64-92	Edible fruits	1						1			
	Duroia eriopila L.	Komaramara	06-92	Edible fruits	1									
	Genipa americana L.	Lana (A)	63-93	Furniture wood, edible fruits, dyes and treating ulcers	1	1		1	1		1	1		
	Guettarda acreana Krause	Eekwa (A)	Obs.	Used in Curare poision		1						1		
Sapindaceae	*Talisia squarrosa* Radlk.	Sand mora	169-93	Fish poison		1					1			1
	Paullinia sp.		11-93	Fish poison		1								
Sapotaceae	*Manilkara bidentata* A DC.	Balata (C)	Obs.	Timber, commercial gum and edible fruits	1	1					1	1		
	Pouteria guianensis Aubl.	Asepoko (A)	02-93	Edible fruits and medicinal properties	1				1			1		
Simaroubaceae	*Quassia cedron* Baill.		Obs.	Soothes skin irritations					1					1
Solanaceae	*Solamum asperum* L.C. Rich.	Boboro (A)	41-92	Edible fruits	1									
	Solanum macranthum Dunal	Boboro (A)	88-93	Easing toothache					1					1
Tiliaceae	*Lueteopis rugosa* Burret	Koyechiballi (A)	Obs.	Housing timber				1						
Ulmaceae	*Trema micrantha* Blume	Kari bush (C)	16-92	Craft fibres		1						1		
Verbenaceae	*Lantana camara* L.	Sweet sage (C)	92-92	Malaria					1					
Vitaceae	*Cissus erosa* L.C. Rich.		73-92	Edible fruits	1									
Unknowns		Bog berries (C)		Fish poison		1								
		Fever Tree (C)		Malaria					1					
		Heekona (A)		Craft fibres		1								
		Itaro (A)		Dyes and edible fruits	1	1								

APPENDIX 1. CONTINUED.

Family	Species	Vernacular name	Voucher specimen no.	Use description	Current study						Fanshawe			
					E	Te	T	C	M	Mi	E	Te	C	M
		Leaf of life (C)		Treating burns and sore eyes					2					
		Lubana (A)		Edible oils and tea	2									
		Sinthia (C?)		Malaria					1					
		Sweet broom (C)		Malaria					1					
		Wild Cabacuro (C/A)		Malaria and a laxative					2					
		Woncimari (A)		Treating sore eyes					1					
MONOCOTYLEDONS														
Araceae	*Philodendron jenmani* Krause	Mibi (A)	60-93	Craft fibres		1								
	Unknown	Snake bush (C)	Obs.	Treating snake bites					1					
Arecaceae	*Astrocaryum aculeatum* G. Mey.	Akuyuru (A)	Obs.	Edible fruits and oils, craft fibres and construction material	2	1		1		2				
	Astrocaryum vulgare Mart.	Awara (A)	Obs.	Edible fruits and craft fibres	1	1				1	1			
	Bactris sp.		Obs.	Treating bronchitis, craft fibres		1			1		1			
	Cocos nucifera L (I)	Coconut (C)	Obs.	Treating typhoid and ear ache, edible fruits and oils, craft and construction fibres	2	1		1	2					
	Euterpe oleracea Mart.	Manicole (C)	27-92	Construction material, edible fruits and palm hearts, and craft fibres	2	1		1			1	1	1	
	Maurita flexuosa L.f.	Ite (A)	Obs.	House material, craft fibres, edible fruits, vegetable ivory and treating dysentery	1	1	1	1	1	1	1	1	1	
	Maximiliana maripa Drude	Kokerite (A)	Obs.	Housing material, craft fibres, edible fruits and oils	1	1		1		2		1		
	Oecocarpus bacaba Mart	Lu (A?)	22-92	Edible berries and oils and craft/construction materials	2	1		1		2		1		
	Socratea exorrhiza H. Wendl.	Boba (A)	Obs.	Craft fibres		1								
Rapataceae	*Rapatea* sp.	Marsh Lily (C)	Obs.	Roofing fibres				1						
Pteridophyta	*Hypolepsis* sp.	Wild Maran (A/C)	38-M	Treating skin sores					1					