

KNOWLEDGE FOR SURVIVAL: TRADITIONAL TREE FARMING IN VANUATU

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A Vanuatu village will have a profusion of fruit trees planted near the houses and around the outskirts—breadfruit (*Artocarpus sp.*), *Barringtonia edulis*, Tahiti chestnut (*Inocarpus fagifer*), *Evia dulcis*. They provide shade, fresh nuts and sweet fruit. Anyone who has ventured into the forest has been able to taste wild nuts or fruit picked along the footpaths.

Barrau (1958, 1962), Yen (1974), Thaman (1989), and many others have written that tree farming is an important element of Melanesian subsistence agriculture. Tree farming has been practised in Vanuatu since ancient times, and the practice is very much alive today.

Finely tuned understanding of the environment and the careful management of hundreds of plant species (many of which are perennials) enable villagers to meet their nutritional requirements with minimum investment in time and effort. Tending is not a true form of farming as much as it is careful management of a territory, with the real work being more intellectual rather than physical.

The results which I shall present are based on the first phase of a programme of protection and development of local fruit-bearing species, carried out under the Agriculture Department of the Vanuatu government. This study is being undertaken by ORSTOM, under the leadership of an ethnologist (myself) and C. Sam, the curator of the plant museum of Port-Vila. Reconnaissance missions are underway in all islands of Vanuatu, to inventory the local fruit-bearing species and to gather information on the traditional methods of tending the trees and of consuming the fruit. Samples of vegetable material are preserved as

specimens and kept at the plant museum in Port-Vila; the trees are numbered; and the information gathered from the villagers is computerized and processed in Port-Vila.

IDENTIFYING AND NAMING THE SPECIES

Approximately 40 tree species in Vanuatu produce edible fruit. Some are consumed regularly, others occasionally, in times of natural disasters (such as hurricanes) or simply to add variety to the daily fare. Many of these fruits are simply gathered by the children during their games. This presupposes that their parents have had the forethought to protect the trees, or to transplant them to places that are accessible to children. It also presupposes that children have been taught to recognize the edible species and to distinguish the ripe fruit from the unripe.

Traditional classification and nomenclature vary from one language group to another. They derive from the more general systems of plant nomenclature specific to each linguistic group. Generally—and simplistically—a primary term is attributed to each botanical genus. A secondary term, usually significant, is attached to differentiate the physically different types within each genus.

The primary term always describes the whole of the edible varieties of the same genus. For example, the three edible *Barringtonia* of Vanuatu (*Barringtonia edulis*, *procera*, and *novae-hiberniae*) are known under the same term, which is *butsu vel* in Pentecost (Apma language), *ndapwi* in Malekula (Wala Rano language) or in Tanna. *Barringtonia asiatica*, whose toxic nut is used as a poison in fishing, is known by another term (e.g., *butsu waba* in Pentecost).

This rule has some exceptions. For instance, *Barringtonia racemosa*, which is not edible, is also known as *ndapwi* in Malekula (Wala Rano language). A qualifier completes the term: *ndapwi neRedmets*, 'devil's navel'. In Ambrym, *Barringtonia procera* is called *tep*; the other edible *Barringtonias* are named *kurgi*.

Furthermore, one observes across language barriers strong correlations between the terms used for the same edible species (e.g., Tryon 1990). This phenomenon reaches beyond Vanuatu and Melanesia to encompass the whole Pacific.

Once the edible genus has been isolated and named, it becomes the subject of detailed observations, which lead to the identification of a number—sometimes a large number—of physical forms. Thus we were

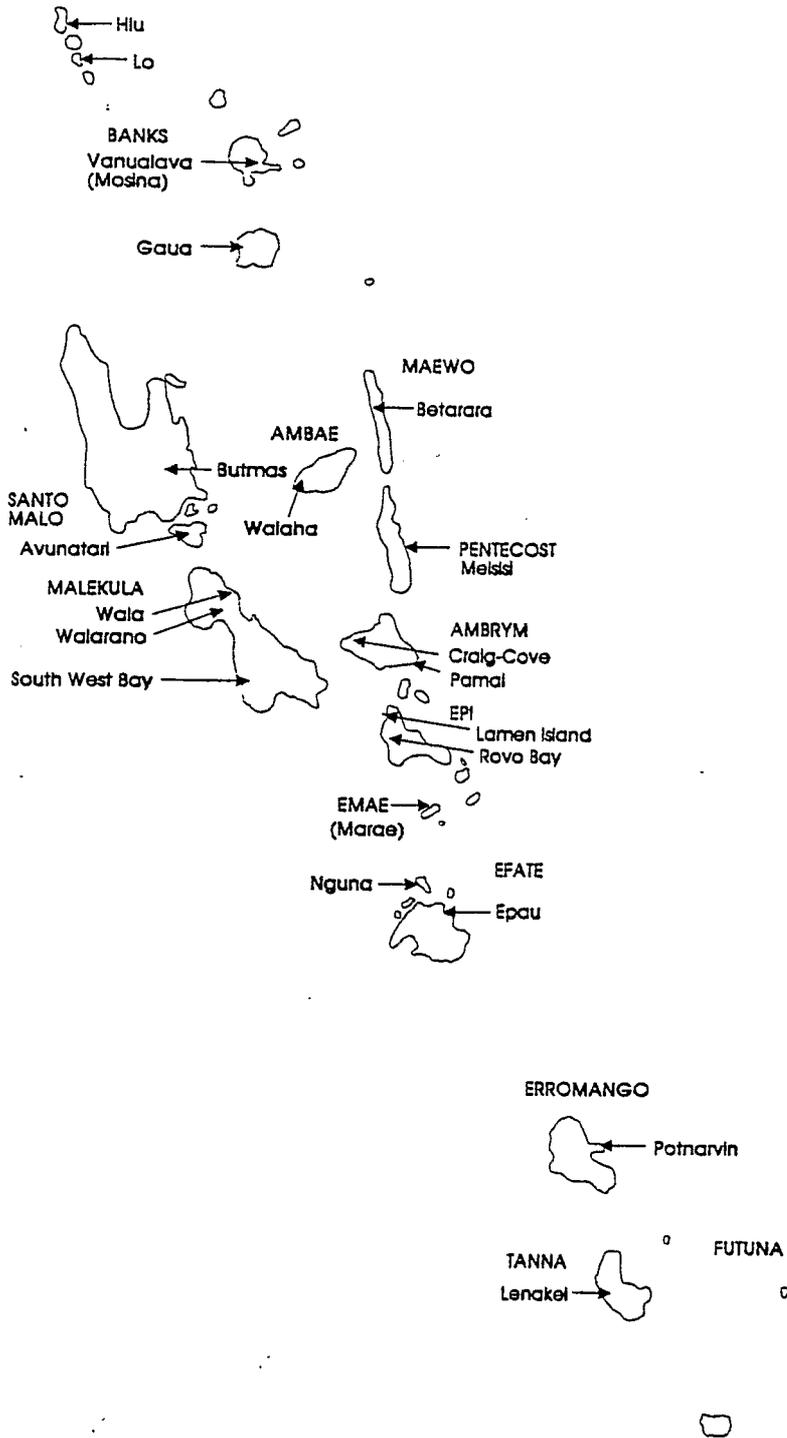


Figure 1. Areas visited during the survey.

able to identify 19 forms of *Barringtonia* among the Apma of Pentecost, 10 forms of *Canarium* among the Mosina of the Torres Islands, and 11 forms of *Inocarpus* among the Wala-Rano (see table 1). The number of plant types identified by each linguistic group is well in excess of 50, just for the 10 major genera of edible fruit (*Artocarpus*, *Barringtonia*, *Burkella*, *Canarium*, *Dracontomelon*, *Evia*, *Inocarpus*, *Pometia*, *Syzygium* and *Terminalis*). This number becomes more than 100 if one includes the banana family and the plants that are consumed only occasionally. It becomes several hundreds if one takes into account all edible plants and their cultivated varieties.

All these types have been identified, but not all have been accurately named. Certain linguistic groups have developed finely

Table 1. Number of Cultivars Counted for Nine Fruit Tree Species

	A	A	B	E	E	E	M	M	M	P	T	T
	B	B	N	M	P	R	A	L	A	E	A	O
	I	R	K	A	I	O	W	K	L	N	N	R
<i>Barringtonia</i>	9	11	9	7	6	3	13	10	9	18	2	7
<i>Burckella</i>	1	2	4	2	2	2	2	4	1	4	2	2
<i>Canarium</i>	3	5	10	12	6	4	5	19	5	9	1	2
<i>Dracontomelon</i>	2	3	1	2	1	2	2	2	3	3	1	2
<i>Inocarpus</i>	2	6	6	3	8	4	2	4	5	18	13	3
<i>Pometia</i>	3	7	2	4	6	1	2	2	8	3	3	3
<i>Spondias</i>	3	2	3	3	2	2	2	1	4	3	1	2
<i>Syzygium</i>	2	4	3	3	6	2	4	2	3	5	5	2
<i>Terminalia</i>	4	4	4	6	3	1	4	1	4	3	34	4

ABI: Ambae	MAW: Maewo
ABR: Ambrym	MLK: Malakula (South West Bay)
BNK: Banks (VanuaLava)	MAL: Malo
EMA: Emae	PEN: Pentecost
EPI: Epi	TAN: Tanna
ERO: Erromango	TOR: Torres (Lo)

differentiated nomenclatures, with the cultivated plants usually named after their physical characteristics. For example, *ndapwi amiveng* means 'red navel' among the fruit gatherers of Wala Rano. Other groups use a simpler nomenclature, with some of the sub-species identified but lacking a special name.

The current decline in the richness of plant nomenclatures reflects the loss of traditional botanical lore. The younger generations, using a

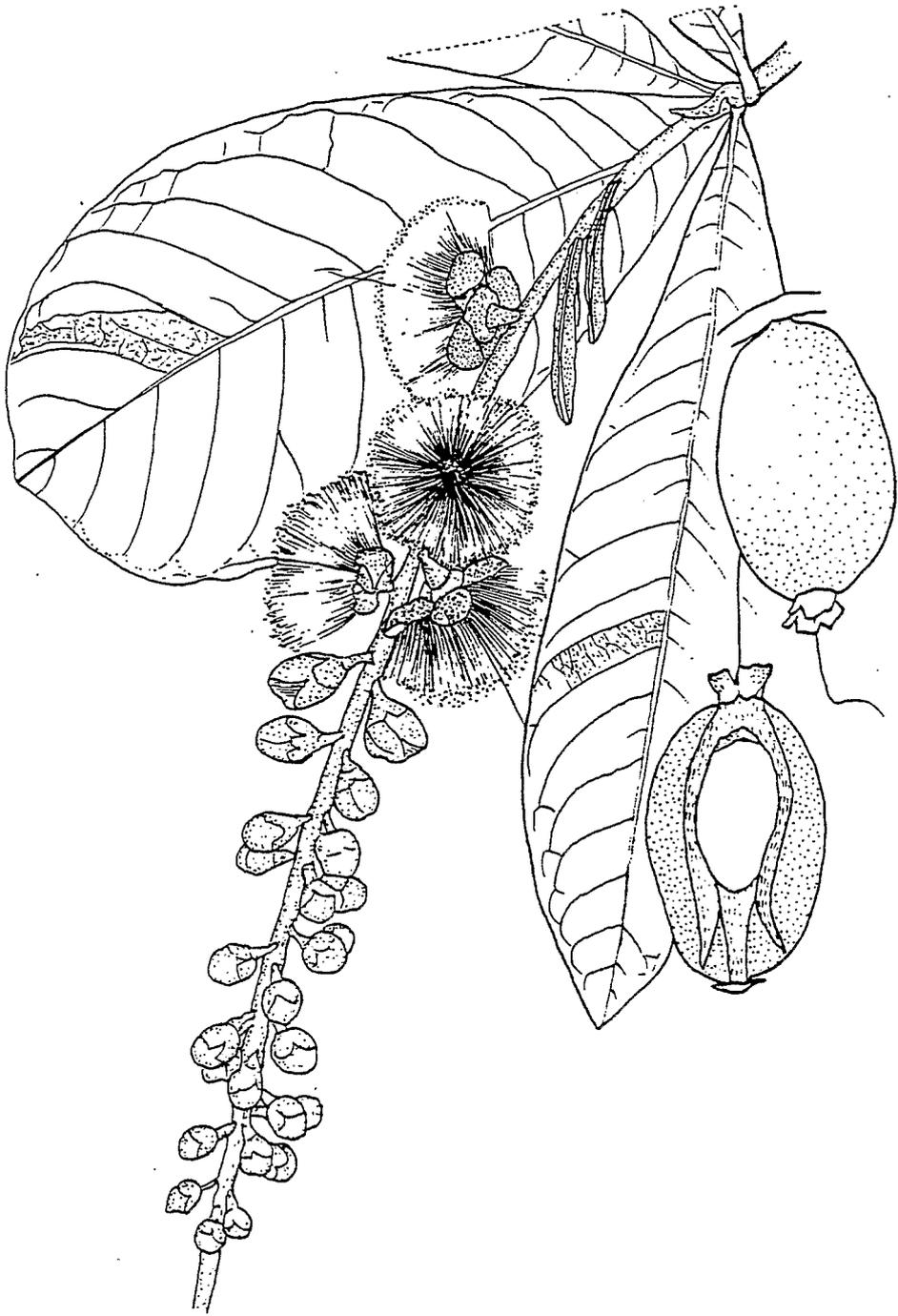


Plate 1. *Barringtonia edulis*.

foreign language at school, tend to have poor knowledge of the names of all cultivated plants. Frequently, children grow up far from their own villages and are no longer able to recognize all the different types of edible species. More seriously they are losing interest in the traditional food plants used by their ancestors. Although these plants used to grow without much human assistance, they were indirectly protected from harm by the older generations' knowledge of their usefulness. The elders used to enjoy assembling collections of a wide variety of types for each edible species, partly just for the joy of having as many different forms of the same plant as possible. The younger generations no longer do this, or they do it to a lesser extent. By losing the taste for this botanical lore, they very quickly lose the option of using these trees. The biological diversity of their diet, the number of food plants available to the villagers who depend on this resource, can only continue decreasing.

KNOWLEDGE FOR THE PURPOSE OF MANAGEMENT

The fruit gatherers of Vanuatu are sufficiently aware of the biological cycles of the fruit-bearing species to be able to use them with minimal investment in time and effort. The great majority of the fruit species are spread around by flying foxes and the *notou* (green pigeons); the former disseminate seeds and nuts well. They relish *Burkella obovata* and can be relied on to spread the pips of *Canarium*, *Terminalia* and *Inocarpus* far and wide. The *notou* will ingest the seeds of *Canarium* and *Dracontomelon* and excrete them even farther afield. These species, therefore, seldom need to be deliberately planted, but their young shoots are protected and respected in the bush. They are usually spared when the bush is burned for gardening, as long as they edge the intended plot.

The particular species requirements for sunlight and their natural hardiness are well understood. Thus, the young shoots of *Inocarpus fagifer*, so plentiful and lively around the base of large trees, are destroyed without hesitation. The villagers eliminate large numbers of them to allow a few to mature. The young *Barringtonias* which are easily smothered by surrounding plant life are regularly weeded and often transplanted nearer to dwellings, where they have a better chance of receiving proper attention.

People know the natural habitat of each species. Along the waterfront, where they are particularly abundant, *Terminalia* are casually destroyed. They will be carefully protected around the inland villages.



Plate 2. *Canarium indicum*.

Similarly, Torres Islanders or Epi Islanders pay scant attention to *Burkella*, which abounds in their forests. Villagers on Pentecost are careful of the few they might find.

Although it cannot be put in figures, fruit gatherers are perfectly capable of estimating the population of each species on their territory. They also know, because each tree is the property of an individual, the ones each is allowed to harvest. Attitudes regarding the fruit-bearing species will partly depend on this knowledge. They will tend to protect rare species and those in short supply within their personal stock while paying less attention to those species which are plentiful. This diversity of varying individual attitudes, taken collectively, adds up to an amazingly effective system for the preservation of the useful species.

Although fruit gatherers are familiar with the fruit-bearing seasons of particular species and value the non-seasonal species, it is difficult for them to relate these fruiting seasons to calendar months. With the number of species used and the fact that most species bear twice a year, their requirements in fruit and nuts are assured all year round.

Knowledge of the use of a rare plant also shapes villagers' attitudes to that plant. For example, *Caryota* (nip palm) is a type of sago palm of which only a few remained on Tanna. The local fruit gatherers knew of the plant but admitted they were ignorant of its uses. They were casual about destroying young shoots they came across. In 1987 Hurricane Uma destroyed the food gardens on Tanna, forcing the population to rely on wild forest plants for survival. The elders had to teach the younger generations anew how to extract the edible sago from the heart of the *Caryota*. Since then the *Caryota* has started to thrive again, now protected by the villagers against the time when another natural disaster might strike.

TREE MANAGEMENT FOR FOOD

The management of fruit trees hinges on complete understanding of their natural cycles. This understanding is transmitted from generation to generation. Should this transmission of knowledge be interrupted, that facet of the subsistence system collapses, with dire results for the nutritional balance of the village population.

The fruit gatherers protect the young shoots and weeds around them. They also transplant them, particularly with the more fragile species, such as *Barringtonia*, and the rarer types. Transplantation is also



Plate 3. *Terminalia catappa*.

done for other reasons. Fruit and nuts are mostly consumed by children, so adults transplant these trees to places that are accessible to children. Thus, each family has near its dwelling *Barringtonias*, *Evias*, *Canariums*, and other species. The larger trees are placed outside the village proper, to avoid broken branches falling on the houses during hurricanes. The *Terminalias*, whose widespread crowns provide pleasant shade, are placed in the middle of little clearings, often with a bench underneath where people might sit a moment for a chat. *Barringtonias* are found lining the village footpaths; breadfruit trees, which require frequent weeding, are placed near houses. The central open space of a village is often graced by a great *Syzygium*, whose brilliant scarlet tassels are highly decorative. Thanks to these trees, the village is a place of nourishment and comfort.

As much as possible, food trees are spread around the perimeter of the garden, transplanted along the edges of footpaths, protected in the forest. Wherever they go, villagers can assuage hunger by nibbling on fruit and nuts. Thus, the forest is perceived as a great natural pantry. It preserves, alive, a great many plant species, many of which are seldom used, but which are always available in case of pressing need. Among these plants are *Cordia subcordata*, *Corynocarpus similis*, *Morinda citrifolia*, *Planchonella costata*, the various varieties of *Ficus*, *Pangium edule*, *Neisosperma oppositifolia* and certain types of *Pandanus*. The trees are often topped in order to slow vertical growth and facilitate harvesting.

People have tried to increase the length of the fruiting seasons of some species and to take fullest advantage of harvests which would exceed village needs. They have identified and given preference to non-seasonal varieties. They have tried to use excess production, either through traditional systems of barter or in local markets. Because fruit-bearing is seasonal and production greatly exceeds need, a great quantity of fruit is lost and is seen rotting around the base of the trees. The fruit gatherers have no means today to avoid such losses. This explains why people do not make efforts to increase production of fruit and nuts, although they agree that great production would not be hard to achieve.

The villagers have also elaborated methods for preserving the fruit. Fermentation pits are used for preserving breadfruit. The fruit of *Inocarpus* can be preserved for months if placed on loosely woven bamboo trays and turned over regularly. It can be buried in deep pits while still green. The fruit of the *Canarium* can be peeled after soaking

in water, dried in the sun, and preserved within its shell. Most often, the kernel is taken from the shell, grilled, and kept in small wicker baskets, either directly over the hearth, or in little huts built specially for the purpose (Banks Islands).

As well as food supplements to round out the daily diet, fruit-bearing trees can be a source of starchy food (*Inocarpus* or *Artocarpus*), which can form the basis of a meal. According to the species, these are consumed either raw or cooked. The fruit of the *Dracontomelon*, for instance, can be cooked in coconut milk. That of *Canarium* or *Barringtonia* is often grilled or mixed to add nutritional value to root puddings.

CONCLUSION

At first glance, the management of fruit trees may appear disorganized. Flying foxes spread seeds. Care for the trees is minimal. There is no systematic harvesting, and a goodly portion of the crop is lost. Fruit is mostly consumed between meals, in what appears to be small quantities and in an occasional manner. In reality, fruit constitutes an essential element of the subsistence system. Fruit gathering, based as it is on a wide understanding of nature and its biological rhythms, sheds light on two fundamental aspects of the subsistence agriculture system in Vanuatu, and probably throughout the island Pacific. First, the system is based on diversity and requires the management of a large number of plant types. Second, the choices that are made as part of this management effort lead to maximal yield for minimal time and effort.

This universe of fruit-bearing trees can be extremely fragile. Frequent hurricanes can destroy a whole year's output. However, the fruit gatherers themselves will tell you that this major handicap is offset by the very diversity of the species they use. It would be unusual for all the specimens of all the useable species to be destroyed at once. The fruit trees are protected through the knowledge of the fruit gatherers and by the constant—if not necessarily physical—care which they receive from the villagers. Should the younger generations lose interest in the trees, should they lose the ability to identify the different types, should they give up assembling these collections of specimens—which represent one of the best ways of preserving them in-situ—should they neglect to spare and protect the young shoots, or start cutting down too many mature trees, should they abandon the rather difficult preparation of

certain fruits, then fruit harvesting is bound to disappear rapidly and irreversibly from village life. The villagers would then be deprived of quality foodstuff and of invaluable emergency supplies in case of natural disasters.

Any programme aimed at developing the cultivation of these fruit-bearing trees must respect their existing diversity. It must also strive to make the younger generation appreciate their value, so that the body of knowledge that supports the entire system is not allowed to die.

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ACKNOWLEDGEMENTS

I gratefully acknowledge funding support from ORSTOM and Le Ministère des Affaires Étrangères for this research, Chanel Sam for the identification of the botanical samples, and Alfreda Mabonlala for the illustrations.

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200 Annie Walter (1994) in: J. MORRISON, P. GERAGHAN & L. CROWL (eds.), *Science of Pacific Island People: Fauna, Flora, Food and Medicine*, vol. 3, Institut of the South Pa