University of Nairobi Occasional Papers in Language and Linguistics Vol. 2 (2004) 86-103

The relevance of ethnobotanical studies to linguistic vitality: The case of plant use and classification among the Digo of Kenya

Steve Nicolle
Digo Language and Literacy Project and SIL International

Abstract

This article summarises the findings of ethnobotanical research conducted among the Digo people of Kwale District, Kenya, together with applications of this research for the benefit of the local community and implications of this for language vitality. The article consists of four sections. Section 1 provides background information on the Digo people and language, the ecology of the region, and the research methodology employed. Section 2 discusses Digo botanical folk taxonomy, that is, the way in which Digo speakers classify plants, and the ways in which this differs from botanical folk taxonomies reported for neighbouring Swahili speakers. Section 3 provides details of medicinal and other uses of a sample of 30 plants. Finally, in Section 4 the relevance of such studies is related to the current debate on the maintenance and interrelation of linguistic, cultural and biological diversity.

1. Introduction

The Digo are the second largest of nine coastal tribes known as the Mijikenda, and are concentrated in the coastal area and eastern slopes of the coastal hills of East Africa from Mombasa, Kenya, south to Tanga, Tanzania (39º longitude, 4-6º latitude). Most Digos live in dispersed family homesteads surrounded by cultivated fields, rather than close-knit villages. The majority are subsistence farmers, growing maize, cassava, rice, beans, bananas and coconuts, and keeping chickens, goats, and occasionally sheep and cows. The Digo language is a Bantu language classified as E.73 (Guthrie 1967-71) or North-East Coast (Nurse 1999).

The data presented in this study were obtained in Chigato village, Waa location, approximately fifteen kilometres south of Mombasa, whilst the author was seconded to work with the Digo Language and Literacy Project.[1] This organisation exists to promote the use of

[1] Research was conducted on behalf of the Digo Language and Literacy Project (Bible Translation and Literacy, E. A.) under Research Permit of the Office of the President No. OP.13/001/17 C 180/20.

the Digo language in education, community development, and religious activities, and is therefore concerned to document threatened domains of language use (such as oral history, traditional stories, and knowledge of local plants) not only for the benefit of anthropologists and linguists, but also and primarily for the local community. For this reason, the research reported in section 3 first appeared in an ethnobotany written in the Digo language (Nicolle 2002).

The goal of this ethnobotanical research was to document which plants are used for medicinal purposes, the conditions each plant is used to treat, and the manner in which it is prepared. However, other information was also volunteered about plants that produce edible fruit, dyes, good timber, etc. Initial information was collected by Myra Adamson in collaboration with Fatuma Juma Malimau, a traditional healer (*mganga*),[2] and by the author in collaboration with Swalee Isa Mwazabe, then Village Chairman of Chigato. This information was then checked by the author against published sources (notably Maundu et al. 1999; Mbuya et al. 1994; Noad & Birnie 1994). Where there were discrepancies between informants or between the informants and a published source, or where information had only been provided by one informant, this information was checked again with both informants and with other knowledgeable Digos. Finally the information on plant use together with the botanical (Latin) name for each Digo plant was checked by Mohamed Pakia of the Ukunda office of the Coastal Forest Conservation Unit (National Museums of Kenya).

Access to government health services is variable in Kwale District, but Chigato village is located close to the main road to Kwale (where there is a district hospital), and is also well served with private clinics. For this reason I was at first sceptical as to whether there would be much use for traditional medicine in Chigato, but this proved not to be the case. This accords with the findings of Boerma (1989): "Contrary to what is generally assumed the traditional medical sector is not losing importance in [Kwale District]. In addition, utilization of traditional healers in Kwale is not affected by the accessibility of modern health services." However, both of the primary informants for this research were born before 1950, and it

[2] There are various kinds of traditional healer, including *aganga a kuzuza* who offer protection from witchcraft (*utsai*), *aganga a mburuga* who treat illnesses caused by demons (*pepho*) and ancestral spirits (*koma*), technical specialists, such as traditional birth attendants (*akunga a chienyeji*), bone-setters and surgeons, as well as herbalists (usually referred to simply as *aganga*). Boerma (1989), Lundeby (1993: 30-33) and Sperling (1988: 196-8) provide more information.

appears that the transmission of traditional medical knowledge to younger generations has been significantly disrupted in this location at least. This situation is probably typical, given that Boerma (1989) estimated that 78% of traditional healers in Kwale District were aged 40 or older, with only 5% under the age of 30. For this reason, I feel it is accurate to describe the Digo terminology for plant species, together with the system of medicinal knowledge which it supports, as a threatened domain of language use.

2. Digo and Swahili ethnobotanical taxonomies

In planning the format of the Digo ethnobotany, consideration was initially given to subdividing the text according to botanical taxa, such as the English distinction between TREE, SHRUB and GRASS. Each language community has its own 'ethnobotanical taxonomy', that is, the way in which speakers of a language classify botanical taxa, and so it was necessary to identify the ethnobotanical taxonomy used by the Digo. In the end, the idea of subdividing the ethnobotany along taxonomic lines was not pursued, as almost all of the featured plants were categorised as the same 'life form'[3] (*muhi*). However, the process of describing a Digo ethnobotanical taxonomy and comparing it with Swahili systems proved informative.[4]

According to Heine and Legère (1995: 25-6), there are differences between the ethnobotanical taxonomies employed by Swahili speakers in different parts of Tanzania.[5] Most Swahili speaking informants from the island of Zanzibar identified only two plant life forms: *mti* ("woody plant"; plural *miti*) and *mmea* ("non-woody plant"; plural *mimea*); these were distinguished using three parameters: size, stem structure and life expectancy, with variations between informants as to how to classify particular plants depending on the relative importance assigned to each parameter (Heine & Legère 1995: 27). In contrast, Swahili speakers from Mchukuuni near Tanga on the Tanzanian mainland distinguished three life forms: *mti*, *mmea* and *nyasi* ("grass"; same plural). In Mchukuuni, the life form *mmea* seems to refer primarily, or possibly exclusively, to cultivated plants (in common with parts of

[3] A life form is a basic category intermediate between a universal, or inclusive, category (such as "plant" or "animal") and more specific taxa (such as "species"). There are usually not more than five life forms for each universal category, and they are typically expressed by primary lexemes (for example, "tree" rather than "evergreen tree").

[4] Nicolle (2001) provides further details.

northern Zanzibar and Pemba; Heine & Legère 1995:29), whereas *nyasi* is used to refer to "small and/or weak plants", i.e. plants that would be classified as *mimea* in Zanzibar. However, there is considerable variation: "For some people in Mchukuuni, *nyasi* includes virtually all plants with the exception of distinctly big trees, while for other people, or else the same people asked in different contexts, only small plants of grass size are *nyasi*." (Heine & Legère 1995:25)

Superficially, the Digo ethnobotanical taxonomy used by my informants in Chigato resembles that of the Swahili speakers in Mchukuuni, in that it recognises three botanical life forms: *muhi* (plural *mihi*; cognate with Swahili *mti*), *mmea* (plural *mimea*) and *linyasi* (plural *nyasi*; cognate with Swahili *nyasi*). Also, the most important characteristic of the life form *mmea* in Digo is that members of this taxon are typically cultivated, as with its Swahili cognate. However, whereas *nyasi* in Mchukuuni Swahili may be used to describe "small trees" (*miti midogo*) and climbers (*miti inayotambaa*), this is never the case with *linyasi* in Chigato Digo. Although large size was mentioned as one factor by which a plant could be identified as belonging to the *muhi* taxon, it was by no means the most important; a number of plants that were classified as *muhi* despite being small were labelled using the diminutive form *chidzihi* (plural *vidzihi*) by my informants, but never as *linyasi*. In fact, none of the plants listed in the ethnobotany were classified as *linyasi*.

Whereas in Zanzibar, the taxa *mti* and *mmea* are distinguished according to the parameters of size, stem structure and life expectancy, the cognate Digo taxa *muhi* and *mmea* are distinguished according to the parameters of cultivation/location, use, size and fruit, summarised in table 1.

[5] There are probably also differences among speakers of Kenyan varieties of Swahili, and between these and speakers of Tanzanian varieties, but unfortunately I do not have data from Kenyan Swahili. The important point, however, is that taxonomical variation can be found even within a single language.

Table 1: Characteristics of the life forms *muhi* and *mmea*

Parameter	*Muhi*	*Mmea*
Cultivation and location	Not cultivated, typically found in the bush (*tsakani*)	Typically cultivated, usually found in farms and gardens
Use	Used as medicine (*dawa*) but not as food, apart from fruits	Plant itself may be used as food or spice
Size	Big (typically over 2 metres)	Small
Fruit	May bear fruit, often edible	Does not bear fruit

These parameters have been tentatively placed in order of importance; thus, although a prototypical *muhi* is large, even a plant such as *chibalazi Mlungu* (*Desmodium velutinum*), which in English would be classified as a herb or grass, was classified by the majority of Digo informants as *muhi* (or *chidzihi*) because it grows wild. On the other hand, *mbalazi* (*Cajanus cajun*, pigeon pea) was classified by all informants as *mmea*, because it is an important cultigen whose fruits are sold commercially, despite qualifying as *muhi* under three parameters: it can grow to over two meters in height, it bears edible fruit, and its leaves are used as a medicine to treat eye complaints. There was also concensus that a seedling of any plant species could be classified as *mmea*.

Given that most of the plants listed in the ethnobotany were non-cultivated plants with medicinal uses it is not surprising that almost all were classified as *muhi*. However the significance of the distinction between uncultivated plants and cultigens goes beyond simply whether they are to be found in cultivated fields or growing wild and whether they are used primarily for medicinal or nutritional purposes. Plants classified as *mihi* are numerous and may have medicinal uses, and as such knowledge about *mihi* is the preserve of trained herbalists (*aganga*) who may specialise in the use of particular plants to treat particular kinds of condition. Knowledge and use of *mimea*, on the other hand, is widespread throughout the community as *mimea* are far more limited in number (although varietals are more often distinguished in cultigens than is the case with non-cultivated plants).

One final difference between Digo and Swahili (both Zanzibar and Mchukuuni) ethnobotanical taxonomies is that the Swahili taxonomies recognise and label an inclusive or

superordinate plant taxon (termed a "unique beginner" by Berlin et al. 1974: 27), namely *mmea* (Heine & Legère 1995: 28-9). Although the label *mmea* can be applied to any seedling in Digo, only one informant used it to designate an inclusive category covering plants in general. The other informants clearly recognised that *muhi*, *mmea* and *linyasi* are the same type of thing (that is, plants) but they did not use a single lexeme to label this category.[6]

3. Uses of selected plants

Nicolle (2002) provides details in the Digo language of medicinal plants and their uses by Digo traditional healers. Because of limitations of space, only some of the plants included in Nicolle (2002) are described below. In choosing which plants to include, I have favoured particularly important plants that are less well described elsewhere, and avoided non-indigenous and well-documented plants, such as *Azadirachta indica* (the Neem tree; Digo name: *Mkilifi* or *Mwarobaini*) and *Adansonia digitata* (the Baobab; Digo name: *Muuyu*). Other uses of some of the plants described below can be found in the relevant literature, but I have only included information that was obtained from or confirmed by Digo informants. Plants are listed alphabetically by botanical name followed by the Digo name in parenthesis. A summary of plant uses can be found at the end of this section.

1. Acacia nilotica *(Chigundigundi)*

The fruits and bark are boiled in water to make a decoction for stomach-ache and headache. The roots are chopped up and soaked in water, and the water may be drunk for chest and abdominal pains, tuberculosis, and constipation. The roots and bark of *Chigundigundi* are used to treat venereal diseases. For sores, rashes, or sore eyes, the leaves can be chewed or the roots soaked and then rubbed on the affected area. Sap from twigs or branches is also a medicine for sore eyes. The root bark or fruits are boiled in water and the liquid drunk for coughs and colds. Juice from the fruits gives a black dye which is rubbed on the eyelids.

[6] Digo is not unique in this respect; Balée (2001: 304) notes that among the Tupí-Guaraní languages of South America for which data is available, none employ a single term for 'plant' in the taxonomic sense.

2. Agathisanthemum bojeri *(Chivuma nyuchi)*

The leaves can be boiled in water as a medicine for stomach ache, or crushed and rubbed into sore eyes and ears. Together with *Chivumbani* (*Ocimum basilicum*), the leaves of *Chivuma nyuchi* are used as a treatment for intestinal worms. The roots can also be crushed and used to treat stomach ache.

3. Annona senegalensis *(Mbokpwe)*

Mbokpwe produces edible fruit (similar to a custard apple). The roots are boiled in water and the liquid is drunk for intestinal pains, vomiting and diarrhoea. The roots of *Mbokpwe* can also be boiled together with the roots of *Chikuse/Chiphatsa* (*Vernonia sp.*) and the liquid drunk for constipation. The bark is used to make a brown dye and string to carry firewood. (For more uses see *Vernonia sp*.)

4. Antidesma venosum *(Mdzengatsongo)*

The fruits are edible and produce a dye. The leaves, twigs and roots are chopped up and boiled in water, and the liquid is drunk to treat abdominal pain.

5. Bauhinia thonningii / Piliostigma thonningii *(Mtseketse)*

The bark gives a red dye, and is also used to treat venereal diseases. The roots and leaves are crushed and soaked in water, and the liquid is drunk once a day for coughs, chest pains and bronchitis. The roots can also be boiled in water and the liquid drunk for dyssentry and diarrhoea.

6. Blighia unijuguta *(Mpwakapwaka)*

The roots of *Mpwakapwaka* and *Chidori* (*Harrisonia abyssynica*) are rubbed together on a stone to make a smooth paste which is rubbed on the roof of the mouth for headache.

7. Carissa edulis *(Mtambuu)*

The roots of *Mtambuu* are boiled together with the roots of *Mdaa* (*Euclea divinorum*) and *Chidori* (*Harrisonia abyssinica*) for stomach ache, venereal disease, and problems during pregnancy. It is also used as a flavouring in stews. Abbink (2002: 202) also reports that Suri

women of south-west Ethiopia use crushed roots of *Carissa edulis* to shorten labour prior to delivery. This is one of the uses of *Carissa edulis* during pregnancy among the Digo (it seems to be a muscle relaxant), but it is also used for general pain relief. Maundu et al. (1999: 85) describe this plant as "among the most important sources of traditional medicine" in Kenya.

8. Catunaregum nilotica *(Mdzongodzongo)*

The roots of *Mdzongodzongo* are cut up, and mixed thoroughly in water. The froth is used as a wash for the whole body, and a little of the water is drunk for excess gas in the stomach.

9. Crotalaria sp. *(Mkelekele wa nyika)*

The leaves of *Mkelekele wa nyika* are crushed and rubbed into sore eyes. The leaves of *Chibalazi Mlungu* (*Desmodium velutinum*) is also used in this way.

10. Dichrostachys cinerea *(Mchinjiri)*

The roots are crushed and put on broken bones, snake bites, and other injuries to reduce swelling. (For other uses, see *Ozoroa insignis*.)

11. Euclea divinorum *(Mdaa)*

Fruits can be used like pepper, and after being boiled in water they give a dye for clothes and mats. Sticks of *Mdaa* are used as toothbrushes. As well as cleaning they are medicinal and also make the lips and gums red.

12. Flueggea virosa *(Mkpwamba)*

The fruits are edible and are also used to treat itching skin. The leaves are crushed and the juice drunk by children who are vomiting or have diarrhoea.

13. Harungana madagascariensis *(Mbonombono)*

If sap from a stalk of a leaf is put over the place where a jigger or thorn has entered and left over night, the jigger or thorn will come out easily. The leaves are also rubbed on the head for headache. If *Mbonombono* is cut, the sap can be used to stop blood flowing. The branches also produce an orange dye for mats.

14. Hoslundia opposita *(Mtserere)*

Mtserere leaves are chewed and applied to cuts to stop bleeding. Scorched leaves can be put on pimples/scabies, or the leaves can be soaked in water to make a wash for itches and rashes. The leaves and roots are boiled together in water which is drunk to treat intestinal worms and stomach pains. The roots of *Mtserere*, *Mbokpwe* (*Annona senegalensis*) and *Mgunga* (*Acacia stuhlmannii*) are pounded and mixed together and put on sores, ulcers and boils.

15. Launaea cornuta *(Mtsunga / Mtsungu wa utsungu)*

The leaves of *Mtsunga* are used to cure and prevent malaria, and are also used to treat stomach pains, ulcers and dysentery.

16. Manilkara sansibarensis *(Mung'ambo)*

The fruits are edible. Strips of bark are cut, pounded into a powder and added to warm water for pneumonia.

17. Ocimum basilicum *(Chivumbani)*

The roots and leaves of *Chivumbani* are chopped up and boiled together to make a decoction for stomach ache. Used together with the leaves of *Chivuma nyuchi* (*Agathisanthemum bojeri*), it also provides a medicine for intestinal worms. A steam bath of the leaves and roots is used for headaches and colds, and the leaves are used to make a tea which can be drunk as a medicine for headache. The leaves are also crushed and soaked in water and used as a wash for itching skin and rashes. Cleaning a house using a broom made from branches of *Chivumbani* deters termites, fleas and mites. Dry branches or leaves are left in grain stores to deter weevils, and are burnt to repel mosquitoes.

18. Ozoroa insignis *(Msalasanga)*

The roots of *Msalasanga* are mixed with the roots of *Chidori* (*Harrisonia abyssynica*) and *Mchinjiri* (*Dichrostachys cinerea*), chopped up and boiled together in water, and the liquid is drunk for stomach ache and enlarged spleen.

19. Pandanus sp. *(Mkpwadi)*

The leaves of *Mkpwadi* are cut into strips and used to make baskets, mats and hats. The young leaves can be dried and cut up and put in clothes or cupboards as they also smell good, and the male flowers are put into coconut oil to make a perfume.

20. Phoenix reclinata *(Uchindu)*

The leaves of *Uchindu* are used for weaving baskets, mats and hats, and for making brooms. The roots are used to make a brown dye, and the fruits are edible.

21. Rhus natalensis *(Mgbwanyahi)*

The roots of *Mgbwanyahi* are crushed and boiled in water, and the liquid drunk for diarrhoea, flu and abdominal pain. The leaves are boiled and the liquid drunk to treat heartburn, coughs and stomach ache. The bark from the roots produces a dye.

22. Sclerocarya birrea, ssp. caffra *(Mng'ongo)*

The fruits are edible and contain a lot of vitamin C. The bark is boiled and rubbed on gums for toothache, and the liquid is drunk for dysentery and diarrhoea; it also produces a dye. The roots of *Mng'ongo* can be chewed or boiled in water as a medicine for coughs.

23. Strychnos spinosa *(Muhonga)*

The roots, leaves and seeds are poisonous, and are used to treat jiggers. They are crushed and mixed with coconut oil, then the oil is rubbed into the area where the jigger entered to kill the jigger.

24. Tamarindus indica *(Mkpwadzu)*

The fruits are sold in many shops, and can be eaten raw or crushed and dissolved in water, to be added to porridge, stews, etc. as a flavouring. Tamarind juice is especially added to fish as it softens the bones. The seeds are fried and eaten. The leaves are chewed for coughs and tuberculosis, and dried leaves are crushed and boiled in water for stomach ache.

25. Trichilia emetika *(Mvure)*

The seeds are very poisonous if eaten, but an oil made from the seeds is used to heal cuts and bruises. The leaves are used to make soap. The bark of *Mvure* is boiled in water and the liquid is drunk as a purgative.

26. Vanguera infausta *(Mviru)*

The leaves are used to treat fever; if a person is feeling a chill, *Mviru* leaves are soaked in water and the water used as a wash to warm the person.

27. Vernonia sp. *(Chikuse / Chiphatsa)*

The roots of *Chikuse* (also known as *Chiphatsa*) are chopped up and boiled together with the roots of *Mbokpwe* (*Annona senegalensis*), and the liquid drunk for constipation. The leaves are used as a vegetable together with other bitter herbs such as *Mtsunga* (*Launaea cornuta*).

28. Ximenia americana / Ximenia caffra *(Mtundukula)*

The fruits can be eaten raw and are chewed for tonsillitis and mouth sores; the seeds can also be roasted and eaten. The fruits are very oily and are threaded onto sticks to use as candles. The roots are crushed and the juice is given to children who have diarrhoea. The roots of *Mtundukula*, *Mdaa* (*Euclea divinorum*), *Mdungu* (*Zanthoxylum chalybeum*) and *Mtantambuu* (*Carissa edulis*) are mixed together and used in a drink and steam bath for fever. The bark and roots give a red dye.

29. Zanthoxylum chalybeum *(Mdungu)*

The, leaves, bark or roots are boiled in water and the liquid is drunk for malaria and other fevers. The leaves of *Mdungu*, *Rahani* (*Ocimum basilicum?*) and *Mgunga* (*Acacia stuhlmannii*) are boiled together and the steam is inhaled for coughs and mouth ulcers, especially in children. The fruits are boiled with the leaves and bark to make a drink which is used for coughs, colds, chest pain, sore throat, asthma, and tuberculosis. Smoke from burning bark of *Mdungu* is used to treat headache.

30. Ziziphus mauritiana *(Mkunazi)*

Traditionally, when someone dies, *Mkunazi* leaves are used to wash the body. The leaves can also be boiled to make a medicine for stomach ache, and the roots are used similarly for dysentery. If the roots and bark are boiled together the liquid is a medicine for catarrhs. The bark gives fibre and a dye.

The plants described above are typical of those for which data is available in terms of the conditions which they are used to treat, the parts of the plants which are used, and the methods of preparation employed. The most common condition treated with medicinal plants is stomach ache (11 mentions), followed by diarrhoea/dysentery and coughs/colds (8 mentions each). If stomach ache is counted together with other stomach-related diseases (diarrhoea/dysentery, intestinal worms, vomiting and constipation) these account for over half of the 'internal' conditions treated. Other internal conditions include coughs, mouth sores, malaria, headaches, venereal disease and pneumonia. Medicinal plants are used less frequently to treat 'external' conditions such as itches/rashes, cuts, jiggers, bruising and sore eyes. Another major use, particularly of bark, is as a dye (11 mentions). There are a similar number of other non-medicinal uses mentioned, such as pest control and use of plant materials for fibre.

The parts of plants which are used most frequently are the roots and leaves; these are each mentioned approximately twice as often as bark, which is mentioned almost twice as often as fruits/seeds, which in turn are mentioned almost twice as often as twigs/branches. The most common method of preparation is to produce a decoction, which involves finely chopping or crushing part of a plant and boiling this in water, which is then drunk. This method is particularly common with root material. The next most common method of preparation is to crush or rub part of a plant so as to extract the juices; these may be applied externally or internally. There are a few mentions of other methods of preparation, such as preparing infusions ("herbal tea") and steam baths, and burning dry plant materials to produce smoke.

4. The relevance of ethnobotanical studies to linguistic vitality

In section 1, I described the Digo terminology for plant species, together with the system of medicinal knowledge which it supports, as a threatened domain of language use. Comprehensive ethnobotanical knowledge is not widespread throughout the community, but is rather the domain of specialists within the community, the *aganga*. However most rural Digos do have some ethnobotanical knowledge, for example of commonly used medicinal plants, or among men of which trees are suitable for the manufacture of bows and arrows.

This domain of knowledge is under threat from two processes. First, increasing access to 'western' medicine and encouragement to seek 'professional' medical treatment to the exclusion of traditional treatment may cause people to lose confidence in traditional medicine and thereby remove the incentive for ethnobotanical knowledge to be passed on to future generations. Secondly, the preservation of Digo plant terminology and ethnobotanical knowledge is threatened by the increasing dominance of Swahili, and in particular by the use of Swahili as the language of instruction in the initial years of education (along with English subsequently) to the exclusion of Digo. There is a risk that children whose initial education is not in their mother tongue will see this as intellectually inferior to the language of education, and thereby develop negative attitudes towards traditional knowledge and practices which are expressed primarily or exclusively through the medium of the mother tongue.

I would like to suggest two ways in which documentation of traditional ethnobotanical knowledge can help to counter these two threats to Digo ethnobotanical knowledge and terminology. Although these suggestions are made primarily with the Digo situation in mind, they may also be applicable to other language communities.

First, the value of botanical medicines, particularly in tropical countries, is increasingly being recognised. It is also recognised that most ethnobotanical knowledge is stored and transmitted through the medium of local languages. Carlson (2001: 490) expresses the relation between ethnobotanical knowledge and local languages as follows:

> "There is a strong interrelationship between botanical resources, language, and ethnobiological knowledge of medicinal plants. [...] In many tropical rural cultures the ethnobotanical information is not written but is passed on orally from generation to generation in the local languages. When the local languages

> and cultures become endangered or extinct, the knowledge of how to use plants as medicines is lost or diminished. Therefore it is essential to conserve the cultures and languages along with the biological ecosystems and species so that the knowledge of how to use these medicinal plants is maintained."

Given this perspective, the preservation of the local language is a necessary by-product of the preservation of ethnobotanical knowledge. Although the importance of ethnobotanical knowledge has been recognised by the World Health Organisation, some governments, and biomedical companies, it is essential that local communities also recognise its importance, since it is they who are the custodians of this knowledge. One way to increase public awareness of the value of ethnobotanical knowledge is to give such knowledge public recognition by publishing ethnobotanies in local languages. Although a lot of ethnobotanical information from East Africa is already available in some excellent publications (for example Dharani 2002; Katende et al. 1995; Maundu et al. 1999; Mbuya et al. 1994; Noad & Birnie 1989) these are typically available only in English, at a level of complexity which puts them beyond the comprehension of most Digo speakers, and at prices which most people cannot afford. Local language publications, although they may not be as visually attractive as major language publications, are affordable and comprehensible to all community members who can read or be read to. Even if such publications convey only a small fraction of the knowledge that is available orally (as is the case with Nicolle 2002), they nonetheless serve a valuable purpose by fostering an awareness of the importance of local ethnobotanical knowledge, and by 'legitimising' this knowledge.

Secondly, documentation of traditional ethnobotanical knowledge can contribute to language maintenance by providing an impetus to mother tongue education. Batibo suggests that where minority languages are used as the language of instruction (as in the Mother Tongue Education policies that have been adopted and are being implemented in Kenya and Botswana), "indigenous knowledge should be used as the basis for teaching environmental sciences, geography, history, and other subjects. Developing the curriculum out of the community's experience will give the languages a new purpose and "brighter" future." (Batibo 2001: 320) This, of course, can only happen if the indigenous knowledge has been

documented and, where possible, verified against and related to generally accepted norms (scientific, historical, etc.).

Such a programme also presupposes that there are sufficient numbers of teachers who have been adequately trained in the mother tongue and that suitable teaching materials are available. This is not to say that teachers and text books provide the only sources of information for such a curriculum; because a mother tongue curriculum is based on knowledge of the local environment, students can easily be given access to data (for example local plants) and expert assistance (for example acknowledged traditional healers). This idea is elaborated by Dr. Ian Saem Majnep, a Kalam from Papua New Guinea, who writes:

> "Nowadays nearly all our children attend school where they sit at desks and study English and arithmetic and science. But learning by doing things oneself is more fun than sitting listening to a teacher or copying from a book. And in the case of biology and nature study, where better for children to start than with their home surroundings, looking at things that they know quite a lot about? Each local school and each class could compile its own reference sources describing the plants and animals and ecology of the local environment, recording names and locations, characteristics and uses, collecting and preserving plant and insect specimens and drawing illustrations and maps." (Majnep & Pawley 2001: 355)

5. Conclusion

The key to successfully using ethnobotanical studies to contribute to language vitality is the involvement of members of the language community, and in particular its younger members. This is true whether an ethnobotanical study is used to increase the status of ethnobotanical knowledge, or whether it forms part of a strategy for mother tongue education. Batibo puts this well when he writes that, "the central actors in the whole enterprise of linguistic and cultural maintenance and promotion are the minority groups themselves. They must be enabled to feel proud of their languages, their cultures, and their indigenous knowledge" (Batibo 2001: 322; see also Batibo 2002: 278-9). For this reason it is important that the results

of ethnobotanical studies be made available in the local languages, so that the communities which shared their traditional knowledge with the researcher can be the principal beneficiaries of the research.

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