

## **THE SOCIAL AND ECONOMIC IMPORTANCE OF *DACRYODES EDULIS* (G.DON) H.J. LAM IN SOUTHERN CAMEROON**

K. SCHRECKENBERG<sup>1</sup>\*, A. DEGRANDE<sup>2</sup>, C. MBOSSO<sup>2</sup>, Z. BOLI BABOULE<sup>3</sup>, C. BOYD<sup>1,4</sup>, L. ENYONG<sup>3,5</sup>, J. KANMEGNE<sup>3</sup> AND C. NGONG<sup>6</sup>

<sup>1</sup>*Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD, UK. Email: k.schreckenberg@odi.org.uk*

<sup>2</sup>*International Centre for Research in Agroforestry, BP 2123, Yaoundé, Cameroon. Email: a.degrande@cgiar.org*

<sup>3</sup>*IRAD, BP. 2123, Yaoundé, Cameroon.*

<sup>4</sup>*Current address: Conservation International, Washington DC., USA.*

<sup>5</sup>*Current address: World Food Programme, Rome, Italy.*

<sup>6</sup>*National Programme for Agricultural Research and Extension (PNVRA), Yaoundé, Cameroon.*

### **ABSTRACT**

This paper reports on the role played by the indigenous fruit tree species, *Dacryodes edulis* (safou), in four communities in Southern Cameroon. Safou is originally a forest species but has now almost completed the shift on to the farm, where it is particularly planted in association with cocoa and coffee plantations. Its oil-rich fruit are an important item in local diets and are widely marketed. The income is particularly important to women and its timing coincides with the need to pay school fees and associated costs. The reasons why different farmers plant safou are very complex and change over time. Extension services could help farmers obtain greater benefits from this resource by promoting participatory domestication and providing advice on tree management and fruit storage and processing.

*Key words:* *Dacryodes edulis*, Safou, indigenous fruit trees, NTFPs, rural livelihoods, extension, Cameroon.

### **RESUME**

Ce papier décrit le rôle joué par *Dacryodes edulis* (safoutier), une espèce fruitière locale, dans 4 communautés au Sud du Cameroun. Le safoutier est d'origine forestière, mais a été transféré progressivement dans le paysage agricole, où il est planté généralement en association avec le cacao et le café. Ses fruits, riches en lipides, constituent un élément important dans le régime alimentaire des populations locales et sont en même temps largement commercialisés au Cameroun et dans la région. Les revenus, issus de *Dacryodes edulis*, sont particulièrement importants pour les femmes. La période de récolte coïncide avec la rentrée scolaire. Les raisons de plantation de cette espèce sont très complexes et varient dans le temps. Les services de vulgarisation pourraient aider les paysans à obtenir des bénéfices plus grands de cette ressource en promouvant la domestication participative et en dispensant des conseils techniques, tels que la gestion de l'arbre et le stockage et la transformation des fruits périssables.

*Mots clés:* *Dacryodes edulis*, Safou, arbre fruitier indigène, PFNL, mode de vie rural, vulgarisation, Cameroun.

\* Author for correspondence

## INTRODUCTION

The research presented in this paper was carried out as part of a project to investigate the opportunities and constraints for farmers in earning incomes from indigenous fruit trees in the humid lowlands of Nigeria and Cameroon. Based on our previous knowledge of the area, we assumed that farmers were already cultivating trees of many kinds. In common with Njenga *et al.* (2000) we were concerned that farmers were not necessarily realising the full benefits of incorporating trees on their farms. Our intention, therefore, was to try to understand why and how farmers were managing the trees on their land and to identify any constraints they faced as well as highlighting opportunities for farmers to reap greater benefits from their tree management activities. Two case-study species were selected, one (*Irvingia gabonensis*) still predominantly collected from the wild, and the other, *Dacryodes edulis* (G.Don) H.J. Lam, already widely planted. In this paper we are reporting specifically on our results relating to *Dacryodes edulis* in Southern Cameroon<sup>1</sup>.

*Dacryodes edulis* or safou (also known as African plum or African pear) was one of the top five species in the prioritisation exercise carried out by ICRAF in the humid lowlands of West Africa (Franzel *et al.* 1996), and its economic importance for farmers in Southern Cameroon is well documented (Ayuk *et al.* 1999). It is one of the most heavily traded wild fruit in the country along with *Irvingia gabonensis* (bush mango), *Cola acuminata* (cola nut) and *Ricinodendron heudelotii* (*njangsang*) (Ndoye *et al.* 1997). In 1997 the value of the domestic trade of safou was estimated at US\$7.5 million, and provided traders with good weekly margins, sometimes up to twice the national minimum wage (Awono *et al.* 2002). Safou is also amongst the most important non-timber forest products (NTFPs) commonly imported into Europe from Central Africa (Tabuna 1999), with a value in 1999 of close to US\$2.5 million.

Like other NTFPs, safou was originally collected from the wild. However, farmers in Southern Cameroon have, for generations been cultivating (protecting naturally regenerated individuals as well as planting from seed) safou in increasing numbers (Boli Baboulé 2002). In most communities, production is now predominantly from on-farm trees, and the management and use of the tree is the subject of a variety of beliefs (Box 1). This project was particularly interested in understanding how women and the poorest members of society are involved in and affected by tree management decisions. The NTFP literature (e.g. Wollenberg and Ingles 1998, Neumann and Hirsch 2000) suggests that women and poor people are particularly dependent on NTFPs because of the low capital investment required and the (often) free access to the resource. But how do these people fare when an NTFP becomes a farm tree? Do women lose out to men in accessing income from farm trees? Do poorer farmers have less access to markets than richer ones? What kinds of interventions could safeguard their interests and help them obtain greater benefits from their tree resources?

<sup>1</sup>A paper is in preparation by Degrande *et al.* to discuss our more general results concerning the distribution of fruit tree species in Southern Cameroon and Southern Nigeria.

**Box 1. Traditional beliefs relating to the management and use of safou amongst the Banen**

Safou has an important social and cultural significance for the Banen of Western Cameroon. They have cultivated the tree for many generations and have a number of beliefs related to its management and use:

- The seeds of fruit which have been roasted can germinate, but the resulting tree will be unproductive or suffer from premature falling of fruit;
- Premature fruit fall can be prevented by sticking a steel blade into the tree trunk or attaching raphia leaves (from a raphia roof) to the tree;
- Rolling the fruit in dust will reduce humidity and therefore prolong their storage life;
- Safou should not be salted during cooking as this leads to premature fruit fall;
- Women who are breastfeeding are forbidden to eat fruit roasted or braised in ashes, but should rather eat them boiled or steamed;
- Leopard meat can only be eaten if it is exorcised under a safou tree in a public place. This tradition is based on the belief that leopards, like other mammals which kill and eat humans, are cursed. The fruit of the tree under which the exorcism is carried out are forbidden to women;
- Certain ways of offering safou fruit to people will ensure their friendship.

**DESCRIPTION OF STUDY SITES**

Research was carried out during 1999 in four communities in South and Southwest Cameroon (Table 1). They were selected to represent different situations with respect to ethnic group, market access, population pressure and land availability, as well as taking into account their agroecology and the presence or not of the case study species for this project (*Dacryodes edulis* and *Irvingia gabonensis*). Livelihood strategies in the area are dominated by agricultural activities. The main farming systems, in terms of land cover, are cocoa plantations, groundnut/cassava mixed cropping systems and melon/plantain field systems (Gockowski *et al.* 1998).

**METHODOLOGY**

In each of the four communities, a core team consisting of natural and social scientists from CIFOR (Center for International Forestry Research), ICRAF

TABLE 1

Main characteristics of the four study sites in Southern Cameroon

SITE	Ethnic group	Agro-ecology	Population density	Access to land	Average farm size	Market access
(n=no. of farms inventoried out of total community size)						
Chopfarm (n=14 out of 14)	Immigrant community from North West province; resident since early 1900s	Low montane forest	Fairly Low	Insecure land tenure; squeezed between CDC plantations and forest reserve; renting is common.	2.2 ha	Dirt road (1/2 hour) access to main market at Limbé; area with regular trade to Nigeria
Elig Nkouma (n=20 out of 40)	<i>Eton</i> ; mainly native	High forest zone de-forested	Medium	Land is becoming scarcer and young households in particular do not have enough fertile land.	2.6 ha	Close to capital Yaoundé, but poor road infrastructure, particularly in rainy season
Nko'ovos II (n=19 out of 30)	<i>Exondo</i> ; mainly native	High forest zone	Low	Families still have a lot of long fallow and secondary forest land to be cultivated as necessary. Renting is rare.	6.0 ha	Good tarmac road with access to southern border with Gabon and Equatorial Guinea
Makénéne Est (n=19 out of 80)	Immigrant community from different origins; resident since late 1930s	Humid savanna	High	Sharecropping very common. No forest. Some families with large plantations, others with no land.	5.3 ha	Key market town on the main road between Yaoundé and Bafoussam; specialises in <i>Dacryodes</i>

(International Centre for Research in Agroforestry) and IRAD (Institut de Recherche Agricole pour le Développement) worked together with local extension officers and NGO staff. The team spent one week in each community and used tools from the participatory rural appraisal (PRA) repertoire (Pretty *et al.* 1995) such as maps, timelines, matrices, calendars and semi-structured interviews, to work with varying combinations of older and younger men and women as well as key informants<sup>2</sup>. The aim of this work was to understand the community's history (particularly with respect to any land use changes), their preferred fruit tree species and the characteristics they particularly liked about the two case study species. Furthermore, discussions were held about the contribution of the fruit trees to household income and constraints in terms of land and labour. At the end of the week, the results were presented back to the community for verification.

A well-being ranking was carried out in all four communities (usually separately with four key informants), on the basis of which 20 farmers were selected across five well-being categories. The exception was the small community of Chopfarm, where all 14 households were included. The selected households took part in the second phase of the study, which involved carrying out a semi-structured interview with the head of the household, where possible in the company of other family members. In addition to basic household data (family size, land holding, tenure, age and education level of household head, main sources of income, etc.), farmers were asked about tree cultivation practices, preferred species and fruit characteristics, and market knowledge. Interviews were carried out by a socio-economic researcher (sometimes two) together with an interpreter/facilitator. Following the interviews, an inventory was made of the fruit trees on the farmer's land. All the farmer's plots were visited and the following information recorded for each fruit tree: species, approximate age, who planted it and why, where the germplasm came from and why it was selected. The resulting data were entered into a Microsoft Access database.

## RESULTS

### Land and tree tenure and access

Customary tree tenure systems are often distinct from, but interact with, land tenure systems (Fortmann 1985, Warner 1995). In some systems, tree planting may strengthen or change claims over land (Berry 1988, Blowfield 1993, Fortmann and Riddell 1985, Johansson 1991). The extent to which traditional tenure systems are a constraint to tree-planting is variable from place to place. Some authors (Shepherd 1992, Warner 1995) argue that customary tenure systems can provide sufficient tenure security to support tree planting. In the

<sup>2</sup>Detailed methodological guidelines for the community-level and household-level work are provided in Schreckenberg *et al.* 1999.

case of Cameroon, however, Egbe (1996) states that the poorly conceived tree tenure system is a major factor that inhibits participation in tree management, agroforestry and regeneration programmes. Formal systems of land and tree tenure are state-dominated and do not encourage tree-planting by resource-poor farmers. According to the 1994 Forestry Law, planting can only be undertaken on land to which the owner has a title deed and, while planted trees are owned by whoever planted them, their exploitation is still subject to authorisations and restriction by the state. Local communities have access to NTFPs which have not been planted, but collection for sale requires a permit and payment of taxes (Egbe 1996).

In practice, we found that few farmers know what the national legislation says about tree or land tenure and it cannot be said to be either a help or hindrance as regards their tree-management decisions. For farmers it is much more important to understand the tenure system that operates locally and to feel confident that their access to trees planted now will be assured into the future. In all four communities, tree ownership is closely linked to land ownership. Although there is a great deal of variation in farm size between and within villages, all the households interviewed had at least some land for which they had secure tenure. On this they can manage the tree resource as they see fit. Where land is rented, farmers usually do not have the right to plant perennial crops except in agreement with the landlord. In the village of Chopfarm, they may obtain the right to harvest safou fruit or to chop down the tree if they first agree to pay the landowner certain 'damages'. In Elig Nkouma, they can harvest the fruit for their own consumption but not for sale. In the case of Makénééné Est, where sharecropping is very common, sharecroppers are expected to replant old cocoa and coffee bushes and similarly to replace the associated ageing fruit trees. This does not, however, give them any rights over the trees. Generally, if land is sold, the purchaser obtains all rights to trees on that land. Unlike timber trees, fruit trees are not sold individually though their harvest may be sold to rural assemblers (locally known as 'buyam-sellam').

Rights to trees are respected to different extents in the four communities. Thus in Elig Nkouma and in Chopfarm, where farm sizes are small and there is no or restricted access to forest resources, tree owners may protect their trees against thieves with 'gris gris' charms. In Nko'ovos II, where forest land is much more plentiful (though all of it is owned by particular families), traditional rights to trees are still well respected and no 'gris gris' are required. Here people are even allowed to gather fallen fruit from a neighbour's tree if it is for their own consumption.

Although a few 'wild' safou trees can be found in the forest, none of the farmers in our study communities collected fruit from these trees as they were generally smaller than those produced by on-farm trees. Access to forest resources is not, therefore, a major factor in determining whether or not farmers decide to cultivate safou. In other areas of the country, such as among the Banen in West Cameroon, safou have been planted for so many generations that their presence in the forest may be used as an indicator for sites of abandoned homesteads (Boli Baboulé 2002).

### Physical distribution of safou

A 1996 study by Ayuk *et al.* (1999) showed that the great majority of farmers in the humid lowlands of Cameroon had safou trees on their land (80%, 94% and 93% respectively in the low, medium and high market accessibility regions). In our case, all but one of the interviewed households had safou trees on their farm. The mean number per farm (Table 2) ranged from 19 to 100. Even excluding the latter figure for Makénéné Est, which was specifically chosen for its abundance of the species, the mean number of safou per farm (21) was at the high end of the range of 5-21 found by Ayuk *et al.* (1999).

Safou accounts for an important share of the total number of fruit trees found in the agricultural landscape in Southern Cameroon. The proportion of safou trees (Table 2) ranged from 21% to 57%. These percentages are much higher than those for 'popular' exotic fruit trees, such as mango (*Mangifera indica*) and avocado (*Persea americana*), which together only accounted for a maximum of 26% of all fruit trees in the study communities. In three of the four sites, indigenous species dominated (> 50%) the fruit tree landscape. Only in Elig Nkouma did exotics make up a greater share (63%) of the fruit trees, apparently because of the proximity of Yaoundé market.

In Southern Cameroon, perennial tree crops are an important component of the land-use system, accounting for 87% of the farm area we inventoried. This percentage is fairly constant for all farm sizes except for very small farms (less than 1ha), where the figure is only 44%. The most important perennials are cocoa and coffee, with cocoa plantations accounting for 85% of tree crops. Only in Chopfarm (surrounded by commercial oil plantations) was oil palm also an important tree crop. As shown in Fig 1, perennial crop plantations are the main location of safou trees, accounting for an average of 91% of all safou trees surveyed. In the case of cocoa and coffee plantations, farmers explained that safou trees provide the necessary shade for good development of the crop. Farmers in Nko'ovos II explained that another reason for preferring to plant safou trees in their tree-crop plantations was that they would receive better fire protection here than in food crop fields, a factor also highlighted among the Banen (Boli Baboulé 2002).

TABLE 2

Mean numbers of fruit trees and safou per farm  
in the study communities

Community	Mean no. of fruit trees per farm	Mean no. of safou per farm	Safou as a proportion of all fruit trees
Chopfarm	45	20	43%
Elig Nkouma	93	26	28%
Nko'ovos II	89	19	21%
Makénéné Est	174	100	57%

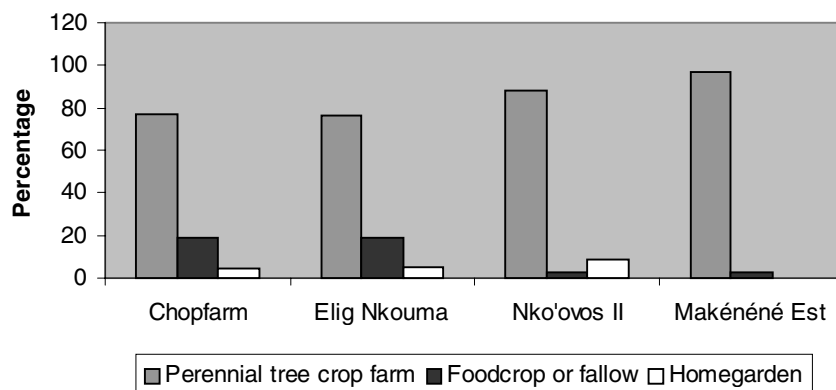


Figure 1. Distribution of safou by land use in four communities in Southern Cameroon

Safou trees have many low branches and are generally considered to produce too much shade for use with food crops. The few, which are found in the food crop fields, are usually restricted to the boundaries. In Chopfarm and Elig Nkouma, 19% of safou trees were found in food crop and fallow land, while in Makénééné Est and Nko'ovos II this was only 3%. This can be explained by the predominance of cocoa plantations, which take a greater share of the area and of the trees, in the latter villages, as opposed to Chopfarm and Elig Nkouma, where less land is available for tree-based farming systems and farmers seem to integrate more trees in the food crop fields. Small-scale fruit orchards including safou were only found in Chopfarm.

Our study highlighted an interesting difference between forest and savanna communities. In the three forest communities, food-crop and tree-crop fields are cleared from the forest. Wild trees are retained and new trees planted to produce a combination of shade and desired products. In the savanna environment of Makénééné Est, the situation is rather different as fruit trees – and particularly safou – are specifically planted together with food crops in order to create the shady environment needed to establish the commercially important cocoa and coffee plantations three or four years later. This process began over 50 years ago and most of the 'initial' food-crop fields are now dominated by cocoa or coffee (making up 97% of the area surveyed).

## Social distribution of safou

### *Wealth and farm size*

In two of the communities (Chopfarm and Nko'ovos II) there is a slight but non-significant relationship between farmers' wealth categories and the number of safou on their farm, with richer farmers having more safou. The trends are not very clear because sample sizes per wealth class were always five or less. Because the wealth classes were defined separately in each community, they could not be aggregated across all four communities.



As farm size was an important criterion used by community members to assign households to different wealth categories, we therefore looked at the relationship between farm size and numbers of safou. Fig 2 shows that, as might be expected, the mean number of safou trees increased with farm size. The fact that the density of safou (number of stems per hectare) decreases with increasing farm size, however, suggests that farmers with smaller land holdings might be using these more intensively. A similar finding was made in western Kenya (Scherr 1995), where poor farmers had higher densities of trees per hectare than wealthy farmers probably because the latter had access to more farmland.

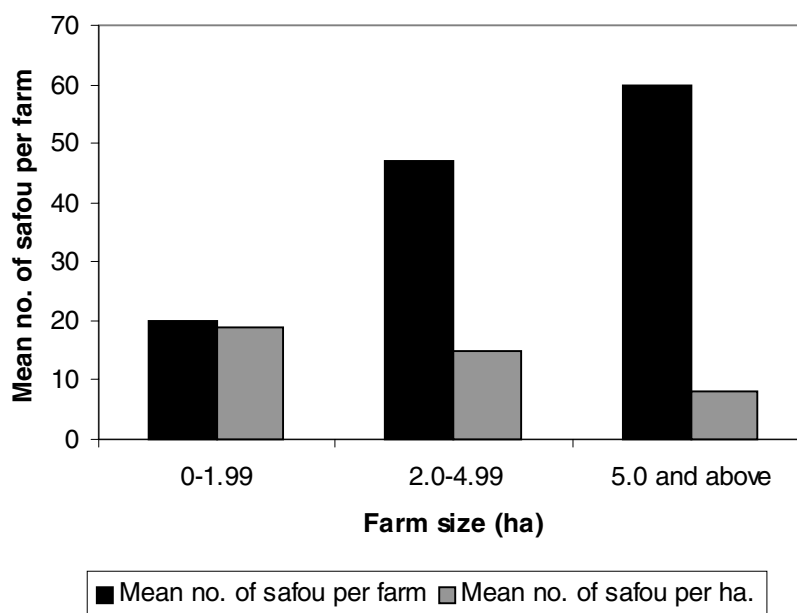


Figure 2. Mean number and density of safou trees per farm

#### *Age and education level*

The age of the head of household had no apparent effect on the number of safou planted. The data relating to education level (Table 3) are not easy to interpret as our sample of farmers with no schooling was very small ( $n=7$ ). They seem to suggest that this group of farmers had higher numbers of safou trees than farmers with either primary or secondary-level education. This difference is explained, however, by the larger farm size of a few of the unschooled farmers, resulting in similar densities regardless of education level. What does seem to differ for the unschooled is that safou makes up a larger proportion of their fruit trees than for other farmers. This might simply be due to small sample size but it could also be that uneducated farmers have less access to exotic tree germplasm because they do not know it exists or where to look for it. The reverse has certainly been observed amongst ICRAF's pilot farmers, where the most educated tend to look for information and germplasm more actively than others.

TABLE 3

Relationship between education level of household head and the number, density and percentage of safou on the farm

Education level	Mean no. of safou on farm	Mean density of safou (stems per ha)	Safou as a percentage of all fruit trees
No schooling (n=7)	85	15	51
Primary level (n=35)	37	15	35
Secondary level and above (n=30)	39	13	36

### *Labour availability*

Southern Cameroon typically suffers from labour scarcities, particularly for clearing fields (Gockowski *et al.* 1998). This could influence farmers' decision-making about safou in two ways. On the one hand, the literature suggests that labour shortages often favour tree-growing because of the low labour input required relative to alternative crops (Arnold and Dewees 1998). On the other hand, labour shortages could be a constraint if planting, management and harvesting of safou were heavily labour intensive. According to Gockowski *et al.* (1998), it might even cause farmers to revert to harvesting the product from the wild as a better use of their labour than planting and managing a resource. The latter scenario can only apply, however, if wild resources are still available, and this was not the case for safou in our study communities.

Our data did not show any relationship between the labour availability within a household (defined as the number of adults and teenagers) and the number or density of safou on the farm. Discussions with farmers suggested that for fruit trees more generally, labour shortages were considered neither an incentive nor a constraining factor when it came to making management decisions. Tree planting and maintenance were not considered to be very arduous in any of the study communities. As fruit trees are usually planted in small quantities (an average of 2–3 per year per farmer), and maintenance is restricted to pruning and removal of parasites, this work can be carried out together with normal maintenance activities in the food crop and cocoa/coffee plantations. As the activities are carried out in such an integrated fashion, it is extremely difficult to distinguish the amount of labour required just for fruit trees, let alone for safou trees in particular.

Harvesting fruit is a more intensive activity. In the case of safou, several trees may be harvested at once in order to obtain enough fruit for marketing. Decisions about timing tend to be taken by household heads. In all four communities, harvesting occurred mainly between May and October, generally with a peak in

August. This just precedes the period of most intense agricultural activity around November when cocoa crops are harvested and processed.

Depending on tree size, harvesting involves climbing the tree and/or knocking the fruit down with a long pole. This is usually done by children or young men. Women and children then collect the fallen fruit. Responsibility for transport and marketing lies with the women in all the communities. In communities such as Chopfarm, proximity to flourishing safou markets (Gabon and Douala in this case) means that farmers no longer need to invest much labour in harvesting or marketing as outside wholesalers bring in their own labour to harvest whole trees.

### *Gender*

Only 11 of our 72 households were headed by a woman. It is therefore difficult to draw any conclusions about the effect of gender on numbers of safou trees. Taking the 11 women together, the mean number of safou on their farms was 11, compared with 23 for the combined male sample of Chopfarm, Nko'ovos II and Elig Nkouma (the data from Makénéne Est, with an all-male sample, were excluded). This appears to be a dramatic difference. Looking at the results on a community-by-community basis (Table 4), however, brings to light more subtle differences. The two women in Chopfarm actually have higher densities of safou on their farms than the men. This is because they both have very small (0.5ha) plots of rented land, a cocoa farm in one case and an orchard in the other, both of which are land-use types in which safou is common. In the case of Elig Nkouma, the difference between the men and women is not remarkable. It is only in the case of Nko'ovos II, where numbers of safou are generally low, that there appears to be a definite difference between men and women, with the latter having fewer safou trees both in terms of absolute numbers and densities per hectare. Four of the six women are widows, but they do not appear to differ from the men in their community in terms of farm size, size of cocoa/coffee

TABLE 4

Distribution of safou trees by gender of household head

Community	Gender	Sample size	Mean no. of safou per farm	Mean density of safou (no. per hectare)
Chopfarm	Women	2	9	18.0
	Men	12	21	8.7
Elig Nkouma	Women	2	20	12.5
	Men	18	26	9.4
Nko'ovos II	Women	6	10	2.0
	Men	13	23	3.4

N.B. Makénéne Est is not included as there were no women-headed households in our sample.

plantations, wealth class or labour availability. The effect may, therefore, simply be a product of the sample size, or perhaps the result of cultural differences, the understanding of which would require more detailed investigation.

### Functional dualism: planting for self-sufficiency or profit?

Arnold (1995) argues that a distinction needs to be made between richer entrepreneurial farmers selecting crops on the basis of their likely profitability and poorer farmers primarily pursuing an objective of self-sufficiency (including the possibility of marketing the product to secure sufficient income to cope). In our four case-study communities, there was only one farmer (an expatriate not included in our inventory sample) who could be described as a 'safou entrepreneur', having planted up several hectares a few years previously with a view to selling the fruit to agro-industrial oil manufacturers. All other farmers saw safou trees as being important both for consumption and sale. Two studies in Southern Cameroon estimate that the proportion of the safou harvest which is marketed ranges from 10% (van Dijk 1999) to 41% (Ayuk *et al.* 1999). While we did not collect data on this particular point, our discussions with farmers and questions about why they had planted each of the safou trees we inventoried, do suggest that safou is changing from being a species predominantly grown for its consumption value to one that is increasingly seen as an income-generating asset.

In all four communities, safou is very important for home consumption. This is particularly true in Chopfarm and Elig Nkouma, where it was ranked higher than all other tree species for its food value. Women in Elig Nkouma particularly liked the fact that the boiled or roasted fruit can be eaten with cassava providing a meal that is quick and easy to prepare at a time when most labour has to be devoted to agricultural activities. In both communities, the inventory data

TABLE 5

Main reasons given for planting safou trees in four study communities in Southern Cameroon

	Sample size (n=number of safou trees inventoried)	Primary reason given for the planting of individual safou trees (as % of total)		
		Consumption	Sale	Other <sup>a</sup>
Chopfarm	275	60	17.8	22.2
Elig Nkouma	510	69	9.6	21.4
Nko'ovos II	352	43.5	44	12.5
Makénéne Est	1898	9.9	77.9	12.2
Overall	3035	28.3	57.1	14.6

<sup>a</sup> This category includes planting for shade, to mark borders, and a few trees for which no planting reason was given or known (e.g. in the case of older trees not planted by the interviewee).

substantiate this claim, indicating a far higher proportion of safou planted for consumption than for sale (Table 5). In Makéné Est, safou was ranked as the second most important food-producing tree (after the oil palm). In Nko'ovos II, it was variously ranked second or third and was felt to be primarily cultivated to satisfy own consumption. This is not quite borne out by the inventory data which suggest that, in this community, consumption and sale are of equal importance as a reason for planting safou.

Gockowski *et al.* (1998) found that sales of wild fruit (a category in which they included safou<sup>3</sup>) have been found to be the most frequently cited non-crop source of income in Southern Cameroon. Certainly all four communities in this study considered the market value of safou to be important, particularly so in the case of Makéné Est and Chopfarm. In Chopfarm, it was ranked second (after oranges) for income. Market access is relatively easy from Chopfarm but the commercial value of safou only became significant in about 1996 when traders from Gabon and Douala started coming to the village to buy the fruit directly from the farmers. The fact that interest in safou as an income-earner is so recent in Chopfarm explains the relatively low proportion of safou trees recorded as being planted for sale during the inventory. In Makéné Est, safou was ranked second (after the oil palm) for market value. During its peak fruiting period, it is the main product sold on the Makéné Est market.

In spite of the relative proximity of Elig Nkouma to the Yaoundé market, access is difficult. Commercialisation is therefore less important although, here too, local traders may come to buy the fruit directly from the tree. In Nko'ovos II, safou ranked second or third in terms of its market value. According to the farmers, this is because, in spite of good market access, the fact that local safou produce relatively late in the season and have fruit of poor quality, means they cannot compete on the market with fruit arriving from the Centre and West provinces of the country.

Taking the four communities together, Fig 3 shows that the proportion of safou trees planted for consumption and for sale has been fairly constant in the

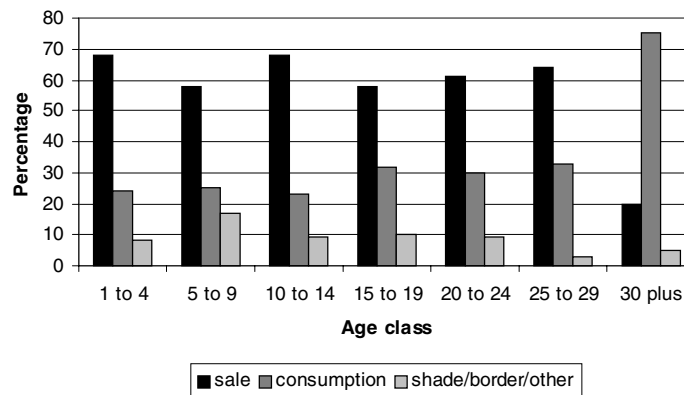


Figure 3. Percentage of safou trees in different age classes planted for various purposes

<sup>3</sup>The majority of safou in Southern Cameroon are actually gathered from on-farm trees which are only 'wild' in the sense that they have not been the subject of any formal improvement programme.

last 30 years. Amongst older trees, however, there is a definite shift towards consumption. Of course, even though an individual tree may be planted primarily for one purpose, it is the fact that the fruit can be used for consumption and/or sale that makes safou so popular. More research is still needed to understand what determines farmers' decisions about how to 'invest' their safou crop, i.e. whether to eat or sell the fruit, and how the two options affect the nutrition and income of different family members.

Fig 4 shows an increase in total numbers of younger trees, apparently corroborating comments from farmers that they are planting more safou trees now than in the past. The data must, however, be interpreted with caution. Firstly, we had to exclude all the trees for which we had no age or 'reason for planting' information: these were often the older trees which our respondents had not planted themselves. Secondly, we do not know anything about the natural population structure of safou. It could be, therefore, that the larger number of young trees represents the replacement of aging and less productive specimens rather than indicating a real increase in numbers being planted.

#### *Storage and transport*

Poor storage and transport characteristics can make safou marketing a rather risky business. Nwufu and Anyim (1998) found that up to half the production may be lost during the main fruiting season due to various kinds of soft rot. These are made worse by mechanical bruising when the fruit are harvested (with a large stick) or badly packed, as well as high temperatures and very low or very high humidity. To a certain extent, the profit farmers make from their fruit depends on whether they go to market to sell the fruit or whether they sell them to traders who come to the villages to buy the fruit directly from the tree (as is the case in Chopfarm). The advantages of the latter practice for sellers is that they get their money in bulk (at once) and not in small quantities, they cut down on labour and transport costs and minimise the risk of theft of fruits on the tree

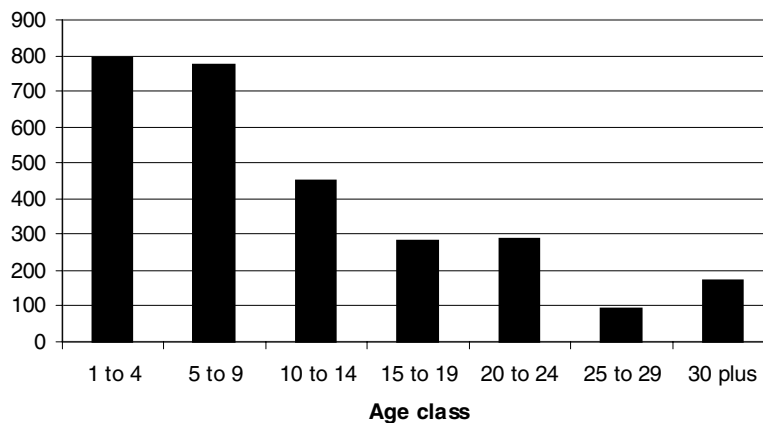


Figure 4. No. of safou trees per age class in four study communities in Southern Cameroon

and of perishability during transport. The disadvantage is that farmers may not have sufficient market information to demand a reasonable price for their fruit. In general, households practise this form of selling in response to difficulties in cash flow and are therefore in a weak position to negotiate prices, particularly if the fruits are sold while still immature. Where this is not the case, villagers prefer to await the traders' arrival before harvesting the trees due to the difficulty of storing the fruit.

Farmers in Makénéne Est stated very explicitly that market access is an important factor in determining whether or not they plant safou trees. They explained that the building of the tarred main road from Yaoundé to Bafoussam through their community in 1985 led to the establishment of the important travellers' market (dominated by stands selling roasted safou). This, in turn, led to an increase in the density of safou in the cocoa plantations, where the tree had previously been planted predominantly to provide shade and for own consumption.

#### *Distribution and timing of income*

While total income derived from tree crops may not be substantial, NTFPs play a role in the seasonal smoothing of income, especially for the poorer sectors of society (Chambers *et al.* 1993, Fereday *et al.* 1997). Although safou is not a principal source of income in any of the study communities, the timing of its income relative to that from other activities makes it an important component of household livelihood strategies.

For both men and women, the period of greatest expense in the year is generally considered to be September/October when school fees and related costs<sup>4</sup> are due (Fig 5a). For men this is a particularly difficult period as they rely primarily on income from their cocoa and coffee crops, which are harvested around November. Women tend to have a range of activities including food crops (particularly tubers and bananas) that bring them a more steady stream of income throughout the year. Nevertheless, the start of the school year is a time when they too have few other income sources, and safou income is particularly welcome (Fig. 5b). In general, fruit trees play a more important role within the women's portfolio than for the men because it is the women who take the fruit to market for sale. The resulting income is used to pay for the family's daily needs including soap, salt and kerosene. A certain proportion may also be returned to the husband, depending on the woman's 'goodwill'.

Attitudes to safou income varied between communities and men and women. The fruit generate most income from around June/July when men's income is at its lowest, and continue to yield some income through to January (as fruit may be left on the tree to capture higher prices late in the season). In Chopfarm, both men and women were just getting used to the fact that safou had recently become a source of income. In Elig Nkouma men felt that safou income is fairly

<sup>4</sup>Although the formal responsibility for school fees tends to lie with the father, in practice many mothers have to contribute to the fees and the costs of uniforms, books, etc.

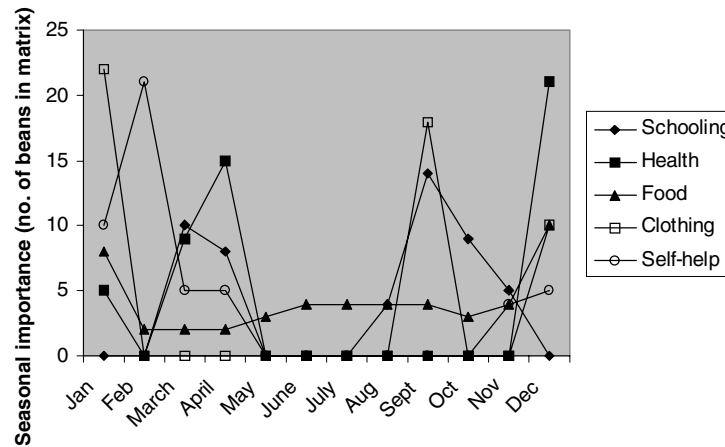


Figure 5a. Main monthly expenditure of women in Makénéne Est

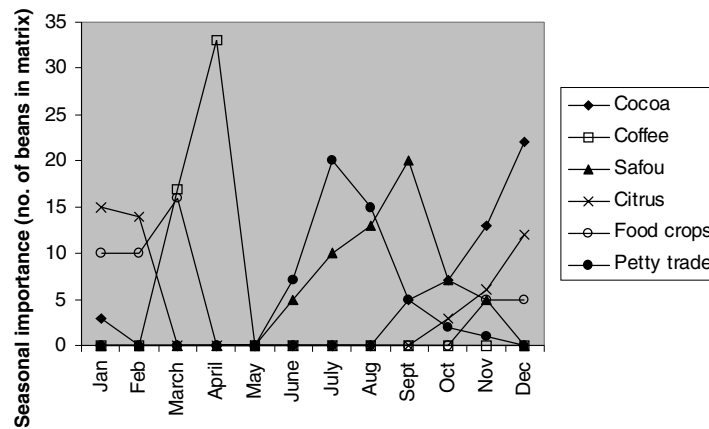


Figure 5b. Main sources of income for women in Makénéne Est.

Note: The data for these graphs were obtained from a PRA exercise in which women were given a fixed number (50) of beans to distribute across the year for each type of expenditure (Fig. 5a) or source of income (Fig. 5b). They show the changing seasonal importance for each type of expenditure/source of income but do not show the relative importance of different types of expenditure/sources of income at any one time.

insignificant relative to what they can expect from cocoa, coffee and oil palm. In Nko'ovos II men ranked safou income fifth, while women thought its potential income value was more important but constrained by marketing difficulties (due to the poor quality and timing of their safou harvest). In general, women were concerned that they cannot rely on safou income due to the irregular production of the tree.

In Makénéne Est, the importance of the safou market has led to a more defined division of labour and revenue between men and women. For the men, safou is the most important source of revenue after cocoa and coffee, and is



particularly appreciated in the period from July to September, when there are no other significant sources of income. While men control the safou harvests in their cocoa farms, they then sell their fruit on to women traders for retail in Makénéne market. In most cases these traders are their wives, who are able to keep any profits they make on the sale. The possibility of obtaining a net benefit not controlled by their husbands is a great incentive for women to get involved in the safou trade. For many the trade has moved well beyond the family context and they regularly travel great distances to the Coastal, South and West provinces to buy up the fruit.

## DISCUSSION

### Benefits to the poor

In Zimbabwe, Price and Campbell (1998) found that there was no relationship between wealth status and tree holdings. Research in Tanzania (Kajembe *et al.* 2000), however, found a significant increase in trees planted as income levels increased. It is certainly possible that the very poorest, with limited or insecure access to land, will be less able to invest in planting and improving tree crops. By contrast, for land-rich farmers, trees may be an attractive alternative to renting out or sale of surplus land (Arnold and Dewees 1998). Our quantitative data showed no strong trends in tree-planting related to well-being class. Nor did we find tenure to be an insurmountable constraint for poorer people: all households had at least some land with secure tenure status. Households with small farms appear to make up for lack of space by increasing the density of their safou trees.

Several studies from Sub-Saharan Africa indicate that poorer people, often women, depend most on NTFP resources (Falconer 1992, Cavendish 2000). There is a concern, therefore, that they may be actively disadvantaged if the resource is domesticated. This concern is less relevant in the case of safou which, at least in our study communities, appears to have been cultivated for so long that there was no mention at all of a shift from wild collection to on-farm location and the possible impact this may have had. Nevertheless, given the potential to domesticate safou more intensively through the vegetative propagation of selected 'superior' trees (Leakey *et al.* 2002), the question remains as to whether this would disadvantage the poorest. In our discussions with farmers on this point, responses were quite varied.

In Nko'ovos II, where planting is the least common, opinions differed as to who would be most likely to invest in tree-planting activities. Some argued that the most well-off would be the first to start planting safou, while others thought the poorest community members would show most interest in improving local fruit trees in order to improve their livelihoods. Yet others said that the work involved in tree planting would mean that only hard workers would take up the option on an intensive basis. In Makénéne Est, with the highest levels of planting, one of the indicators of well-being was the ability to create a plantation

of your own trees rather than having to work for somebody else. Planting good quality trees, in the form of an orchard of selected trees, however, was considered to be a luxury reserved for the very rich. The fact that an expatriate has planted up a large tract of land with safou is a concern to many who fear that he will soon monopolise the market with a good quality product leading to a reduction in livelihoods for other families. On the other hand, it has also galvanised the young men in particular, all of whom are keen to imitate the expatriate and cultivate good quality stands to enable them to market fruit beyond the local markets.

It does not seem, therefore, that further improvement of safou will necessarily disadvantage poorer farmers as all farmers are keen to ensure that the trees they have on their land (however many that may be) are the best possible. The value of fruit on a 'good' safou tree may be up to \$150 compared with only \$20 for the fruit of a 'poor' tree (Leakey and Tchoundjeu 2001). Nevertheless, very large-scale planting by one or two farmers clearly may be a disadvantage to their neighbours. Farmers with large land-holdings are more likely to decide to plant safou if they are able to obtain improved trees (e.g. with better fruit and more consistent yields). The key issue here is that it is not domestication *per se* which can disadvantage poorer farmers, but rather who controls the process. As long as poor farmers have equal access to the skills and materials necessary to produce improved trees and market the product, then they will be no more disadvantaged vis-à-vis large farmers than with respect to production of any other crop. This is the basis for ICRAF's participatory approach to domestication (see Tchoundjeu *et al.* 2002), which enables even small farmers to propagate their best trees rather than having to purchase nursery-produced seedlings.

Safou is particularly found in perennial tree crop fields, in a simple form of two- or three-layered agroforestry. Unlike their more complex cousins in Southeast Asia, these simple agroforests are usually focussed on a single commodity (e.g. cocoa or coffee). This can expose farmers to high risk at times of price fluctuation, policy change or natural disaster (Tchoundjeu *et al.* 1999). Much has been written in recent years about the effects of the economic crisis and the devaluation of the CFA Franc on tree-planting in Cameroon. Authors such as Ndoye and Kaimowitz (1998) argue that the crisis led to a reverse urban-rural migration, with more people returning to survive off the land. At the same time, the fall in world coffee and cocoa prices, and the effects of structural adjustment on the cocoa trade in Cameroon, meant that farmers had to rely more on their various companion crops to make any profits from their tree-crop plantations. Our data do not enable us to link the planting of safou trees to any particular economic events. Nevertheless, farmers indicated that the financial buffer provided by safou and other valuable fruit trees in their cocoa and coffee plantations was an important factor in their decisions not to tear up their cocoa farms when prices collapsed. Instead, they simply invested less labour in them, thus making it possible to return to them once prices improved.

### **Benefits to women**

Berry (1988) lists a number of factors that may prevent women in West Africa from investing in tree-planting. These include restrictions on women's rights to plant permanent crops. As tree-planting is a traditional claim to land ownership in many areas of Cameroon, Burnley (1999) argues that encouraging women to plant trees (as has been done by a project in the Limbe area) allows them to own land for the first time. Our research indicates that in some communities, such as Elig Nkouma and Nko'ovos II, women are able to plant trees but that this does not necessarily affect their land tenure. Although the women's rights are recognised within the family, the trees officially belong to the household head. It seems then that customary tenure systems are not an insurmountable barrier for women wanting to plant trees, but that they need to be considered carefully from site to site. A more important constraint highlighted in this study, and also mentioned by Berry (1988), is that trees are more easily integrated into male farming systems. Safou is typically associated with cocoa and coffee plantations, which are very much in the male domain. Women predominantly have food crop fields in which they are less willing to include shade-producing trees. More research is therefore needed to develop systems (e.g. trees with less dense canopies, pruning practices, tree-crop combinations, etc.) that would make it more attractive for women to integrate trees into their fields.

Tenure and land-use issues are constraints that need to be overcome. However, initiatives designed to benefit women should also focus on the marketing of the fruit as, regardless of who plants or owns the tree, this is the activity that brings in the income for women. In all four communities, the incomes from safou tend to be more important for women than for men (see also Awono *et al.* 2002). There are concerns in the literature, however, that as fruit become more of a 'cash crop' the benefits may shift from women to men (Poulton and Poole 2001). This was borne out by experience in Chopfarm, for instance, where traders were coming to the village to buy up the harvest from whole trees directly from the men, leaving the women no chance to make their usual small profit on market sales. This development in Chopfarm was very recent, however. In Makénéne Est, where the safou trade has been much more intense over a longer period it has led to a different division of labour (and income) between men and women. Men remain responsible for harvesting and selling the fruit to women traders (frequently their wives), who take them on to Makénéne market for retail. Having purchased the fruit from their husbands, the women are not bound to return sale proceeds to them as they are in the other communities, but can instead have full control of any profits they make. This suggests that interventions designed to help women maintain control of the marketing of the fruit (against competition from external traders) may be the most important way of ensuring that their incomes do not suffer as safou is planted more intensively.

At the same time, a focus on the multiple benefits of safou (for own consumption, shade provision for cocoa and coffee, as well as sale) should

prevent the tree from becoming a standard ‘cash crop’ which might be vulnerable to take-over by men.

### **Access to skills, planting materials and technical support**

There is a range of physical inputs (planting materials, credits) and more knowledge-based inputs (particular skills) which farmers need once they have decided to plant trees. They have in common that they could all be provided in some way by extension services. The case of safou adds to the body of recent research which, according to Scherr (1995), documents the remarkable degree to which farmers in many regions have intensified tree-growing activities in recent decades, without significant external intervention. Farmers in the study villages have been planting safou for many generations and, through selection of preferred phenotypes, have succeeded in improving desirable characteristics such as fruit size (Leakey *et al.* submitted). They have done this in spite of a complete lack of extension on matters relating to tree-planting. Providing advice on trees on farms has not been in the mandate of the Cameroon Forest Service which, until recently, has been an old-style policing body focussed on producing timber and issuing permits. Nor have most agricultural extension officers had the expertise necessary to deal with this issue. Few of the farmers we spoke to had had contact with either government or NGO extension agents and most had received no advice on tree-planting.

Our research confirmed work by Blowfield (1993) and Godoy (1992), which found that few financial commitments are needed for the planting and improvement of indigenous trees and that lack of credit is not mentioned as a constraint by farmers. In all the study communities most safou trees are planted from seed (as was also found by Ayuk *et al.* 1999). These are obtained from the farmer’s own field or from a neighbour’s tree. In some cases, if farmers eat a particularly tasty fruit at the market, they will keep the seed for planting. In addition, if a safou tree seeds naturally in a farmer’s field it is usually left to grow until maturity, when a decision will be taken about its future based on how well its characteristics respond to the farmer’s requirements.

Based on our research, we broadly agree with Arnold (1995) that, in general, it is difficult to find evidence that support in the form of seedlings and inputs is needed for tree planting. Nevertheless, good extension can stimulate tree-planting. Farmers in Nko’ovos II, for example, dated their interest in retaining and planting the forest tree, *Irvingia gabonensis*, to the late 1970s when the National Institute for Agricultural Research provided information on *Irvingia* and distributed seedlings. Access to information (and seedlings) had also been important for a few farmers in Chopfarm whose interest in tree-planting (particularly of more unusual species) had arisen as a result of working for a nursery run by the Limbe Botanic Garden.

More important than the provision of physical inputs, is the extension of advice, particularly on tree management (an important component of the domestication process). Farmers currently have a very limited knowledge of tree

management and improving this could greatly increase the benefits they obtain. In addition, farmers in all four communities were keen to receive extension advice on how to improve the characteristics of their safou trees. While farmers have a good idea of what kinds of traits they would like to see in their trees (Box 2), they are discouraged from investing more in tree cultivation because propagation from seed does not guarantee that desired traits in the mother tree will be passed on to the progeny. Experience of buying apparently improved seedlings of other species (e.g. mango and citrus) makes some farmers worried that even improved varieties may not have predictable characteristics.

To deal with farmers' frustration at their lack of control over the quality of the fruit of trees planted from seed, participatory domestication techniques should be promoted more widely by extension services. This means that farmers are

### **Box 2. Desired characteristics of safou trees**

At the level of the tree, resistance to disease (including retention of fruit to maturity) was considered to be the most important characteristic. This is because the tree is susceptible to a large number of diseases. Villagers in Makénéne Est then wanted trees which produced fruit outside the normal season while people in Nko'ovos II placed the emphasis on consistent production. Chopfarm residents wanted a higher yield and earlier maturing trees (although people in Elig Nkouma felt that safou already matures fairly quickly and this is not a trait to focus on). The shape of the tree was considered less important as it can always be controlled through pruning. Some older people did, however, prefer smaller trees for ease of harvesting.

With respect to the fruit, people in Elig Nkouma and Nko'ovos II were most concerned about the taste, whereas the other two communities (in which commerce played a greater role than consumption) considered fruit colour and size to be most important. In general, Nko'ovos II farmers complained that their safou fruit are of poor quality and therefore do not fetch a good market price. It is quite likely that the poor quality is in part because they have relatively few safou trees and thus a smaller base from which to select. In contrast, the high levels of planting in Makénéne Est have allowed farmers to create a population which they say is already very 'tasty' and now just needs further selection for fruit size and colour.

actively involved in identification, selection, improvement and production of quality germplasm (Tchoundjeu *et al.* 2002). By empowering growing numbers of farmers to produce their own germplasm and make it more affordable for others, participatory domestication can help to avoid the risk that the wealthiest reap the greatest benefits. It can also cope with the fact that preferred traits vary within and between communities. If carried out by farmers themselves, improvement can proceed along several fronts to give rise to different types of

trees which meet the needs of, for example, elderly people who cannot climb trees to harvest them, farmers who are planting the tree primarily for its combining ability with cocoa and coffee, (women) farmers who would like to plant more but need trees which combine well with food crops, etc.

Participatory domestication has now been tested in Cameroon for some years by ICRAF and IRAD. A first step towards scaling up these efforts to a national level has recently been taken with the training of the 'perennial tree crop specialists' of the national extension service (PNVRA) in domestication of indigenous trees. An important component of this training consisted of providing the extension staff with the methodological tools to identify the constraints faced by farmers trying to domesticate trees and to determine an appropriate intervention. This was a first step towards enabling extension agents to engage with the real problems faced by farmers rather than only providing them with information on conventional perennial crops such as cocoa, coffee, citrus and mango. Eventually, extension services should be able to offer information on a number of different safou varieties (the production of which would be in the hands of private, group or NGO nurseries) together with advice on different management options in order to ensure that all members of the community are afforded an opportunity to increase the number of trees on their farm. This may require more research not just into the tree – and the ways in which it can be improved – but into the different types of farming system within which it can be integrated. Some research (e.g. by Gockowski and Dury 1999) has already been carried out to compare the benefits from cocoa cultivated with various densities of fruit trees, but more is needed to understand the economics of other systems integrating fruit trees such as those based on oil-palms or mixed orchards.

The other area in which farmers requested advice was in overcoming the perishability of the fruit in order to allow for easier marketing. This is a subject which has not traditionally been the remit of natural resource extension agents and will require good collaboration between different government and NGO services.

## **CONCLUSIONS AND RECOMMENDATIONS**

The fact that so many farmers in many different communities in Southern Cameroon are already planting safou in quite high numbers gives some indication of its contribution to sustaining their livelihoods. It is easily prepared and thus a favoured meal during a busy agricultural season. In addition to its use for direct consumption, safou is increasingly planted as a source of income. In terms of total value, this is more important for women, for whom the marketing of safou fruit is one of the few relatively independent sources of income they have. Its timing, however, also makes the income important for men, coming at a time of year when they have few other income sources. Safou is particularly found in perennial tree crop fields, sometimes planted specifically to create a



shady environment in which cocoa and coffee will thrive, and provides an important buffer when commodity prices fall.

Tenure is not an insurmountable constraint to planting safou as most households have at least some land with secure tenure. Nor is labour a particular problem as tree-planting and maintenance work is integrated with that required for other tree crops. Nevertheless, bottlenecks at harvest-time may require the hiring-in of additional labour. To date, extension advice on safou (or other indigenous fruit trees) has been almost non-existent and, although farmers have already taken decisive steps on the road towards domestication by themselves, there are a number of constraints to increased planting of safou which research and extension could help to overcome. These include:

- poor access to markets (and market information);
- poor storage characteristics of the fruit;
- poor quality/timing of harvest;
- lack of control over quality of the fruit of trees planted from seed.

Improved market access is a general recommendation which would benefit communities in many ways including making marketing of safou fruit easier. Improved market information systems should be targeted first and foremost at women, for whom the safou trade is particularly important). The risk that men will take over this area of work can only be averted if women are helped to organise and obtain the credits necessary to buy up whole safou trees, hire the harvesters and the transport to get the fruit to market quickly.

The poor storage characteristics of the fruit may, in part, be attenuated, by selection for longer lasting fruit and research into storage methods, but the main interventions must be to speed up the harvest-to-market process for fresh fruit at the same time as investigating different processing options. Some women's groups are beginning to experiment with a variety of different safou products, from frozen paste for use in cooking to crispy snacks. There is also an interest in the industrial use of the oil from the flesh and the kernel (see Kalenda *et al.* 2002).

The main route for dealing with the variable quality of the fruit and trees must be through further investigation into the naturally existing variation (see Leakey *et al.* 2002), the participatory domestication approaches described earlier, and better management advice.

Finally, this study highlights the fact that the reasons why farmers plant an indigenous fruit tree species such as safou, are very difficult to unravel. It is not possible to state definitively that the species appeals predominantly to men or women, the rich or poor, people with certain kinds of farms and land use, or the young or old. The interaction of these and other factors is extremely complex and only serves to warn against any uniformity of approach. Instead we must learn to work with and support the dynamic nature of farmers' decision-making and value the diversity of their experience.

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