

Scaling up the Benefits of Smallholder Forestry beyond Timber: Success story of Teak (*Tectona grandis* L.f.) Leaves Marketing in Southern Benin

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Summary

The marketing of teak (*Tectona grandis* L.f.) leaves was studied in southern Benin, in order to seek out opportunities for increased financial returns in smallholder tree growing. A survey was carried out across the commercialization system. Seventy-six traders were interviewed in nine markets purposely selected, based on their functions in the commercialization system. Respondents provided information on their marketing functions, the costs borne, and their revenues. The marketing system was led by women who controlled the main functions. Three categories of traders were identified, namely collectors-wholesalers-retailers, collectors-retailers, and retailers. The commercialization of teak leaves increases the return from tree growing. Traders' monthly revenue was XOF 4,659–15,927 (USD 9.3–31.9) during the rainy season and XOF 6,621–21,655 (USD 13.2–43.3) during the dry season. As substitute for polyethylene bags in food packaging, teak leaves offer a potential to tackle environmental pollution in southern Benin. The study shows the necessity to consult beneficiaries to ensure the proper selection of tree species in farm forestry programmes.

Résumé

Accroître les retombées de la foresterie paysanne au-delà du bois: Success story de la commercialisation des feuilles de teck (*Tectona grandis* L.f.) au Sud-Bénin

La commercialisation des feuilles de teck (*Tectona grandis* L.f.) a été étudiée au Sud-Bénin, dans le but d'identifier des opportunités pour l'accroissement des retombées financières de la foresterie paysanne. Une enquête a été réalisée dans le système de commercialisation. Soixante-seize commerçantes ont été interviewées dans neuf marchés sélectionnés suivant un échantillonnage raisonné. Les répondants ont fourni des informations sur leurs fonctions de commercialisation, les coûts et les revenus obtenus. Le système de commercialisation des feuilles de teck est dominé par des femmes qui contrôlent les principales fonctions. Trois catégories de commerçantes ont été identifiées, notamment les collectrices-grossistes-détaillantes, les collectrices-détaillantes, et les détaillantes. La commercialisation des feuilles de teck permet d'accroître les retombées financières de la plantation d'arbres. Le revenu mensuel des commerçantes est compris entre 4 659 et 15 927 FCFA (9,3-31,9 dollars US) pendant la saison pluvieuse, et entre 6 621 et 21 655 FCFA (13,2-43,3 dollars US) en saison sèche. En tant que substitut des sachets de polyéthylène pour l'emballage des produits alimentaires, la commercialisation des feuilles de teck constitue une opportunité pour réduire la pollution environnementale au Sud-Bénin. L'étude a montré la nécessité de consulter les bénéficiaires, pour une sélection adéquate des espèces à promouvoir dans les programmes de foresterie paysanne.

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Introduction

Poverty alleviation and food security remain critical concerns in Sub-Saharan Africa (19–27). Accordingly, market oriented agriculture has become a major policy option in the region (11, 32). In addition, livelihood diversification for smallholder farmers is receiving increasing attention (7, 14), because of the challenges faced by agriculture today. These include climate changes (22), post-harvest losses (16, 20), volatility of commodity markets (27), and deforestation (9).

On-farm tree growing, also referred to as smallholder forestry – i.e., the management of small woodlots by smallholder farmers (13) – is viewed as a promising option to address some of the challenges mentioned above. First, tree growing is a mean to take advantage of marginal lands (3, 21). Second, given the decline of natural forest areas in most tropical regions, smallholder tree growing is expected to play a meaningful role in the satisfaction of the demand for forest products (21, 28), the rehabilitation of degraded lands (15), and the provision of environmental services. Last, as a cash crop practiced by millions of farmers around the world, tree growing has the potential to improve livelihoods, and support poverty alleviation (24, 33). Although on-farm tree growing is socially desirable, it is unattractive to farmers in certain regions, because of poor financial returns. Therefore, frequent replacements of smallholder plantations by more lucrative crops have been reported (2, 23). Against this background, the question “how to make smallholder forestry more attractive to rural households?” has a critical importance to policy makers.

Timber is often viewed as the only source of income for smallholder tree growers (5, 6). Therefore, product diversification is a potential way for increased return to tree farmers. The objective of this paper is to illustrate the multipurpose management of farm-grown tree stands, based on smallholder teak (*Tectona grandis* L.f.) planting in southern Benin.

While teak is mostly valued for its timber used in small constructions, furniture, shipbuilding, and decorative building (25), its leaves are also

valorised in southern Benin. As a success story of income diversification in smallholder tree growing, the marketing of teak leaves in southern Benin is useful to support the discussion on policy options for increased financial return to tree planters. Although this study is located in Benin, it is useful to enlighten decision makers in most Sub-Saharan African countries, given the challenge of poverty tackling in this region, the issue of poor financial return in smallholder forestry, and the critical importance of this activity in the provision of forest products and environmental services.

This paper is organised as follows. The next section deals with the research methods. The results and the discussion are presented in sections 3 and 4, respectively. In the last section, the main findings are summarised with the related policy implications.

Methods

Main features of the study region

The study was carried out in the Atlantique and Littoral departments, in southern Benin (Figure 1) where teak has been planted by smallholder farmers (3). That region covers 3,312 km², with a total population of 2,075,422 (18). The climate is sub-equatorial; with two rainy seasons (March to July, and September to October) alternating with two dry seasons. Mean annual rainfall and mean annual temperature are 1,100 mm and 27 °C, respectively. The region is characterised by the predominance of oxisoils. The local economy is dominated by farming, trade and craft industries. Maize and cassava as main staple food, and oil palm plantations are key components of rural livelihoods. Smallholder forestry is developed, with teak (*Tectona grandis* L.f.) as the most planted species.

Sampling and data collection

The study was carried out mainly in markets where traders of teak leaves were surveyed. Markets were purposively sampled based on their functions in the commercialisation system. Three types of markets were identified: rural, peri-urban, and urban markets. Rural markets are connected to rural areas where teak plantations are developed while urban markets are located in cities.

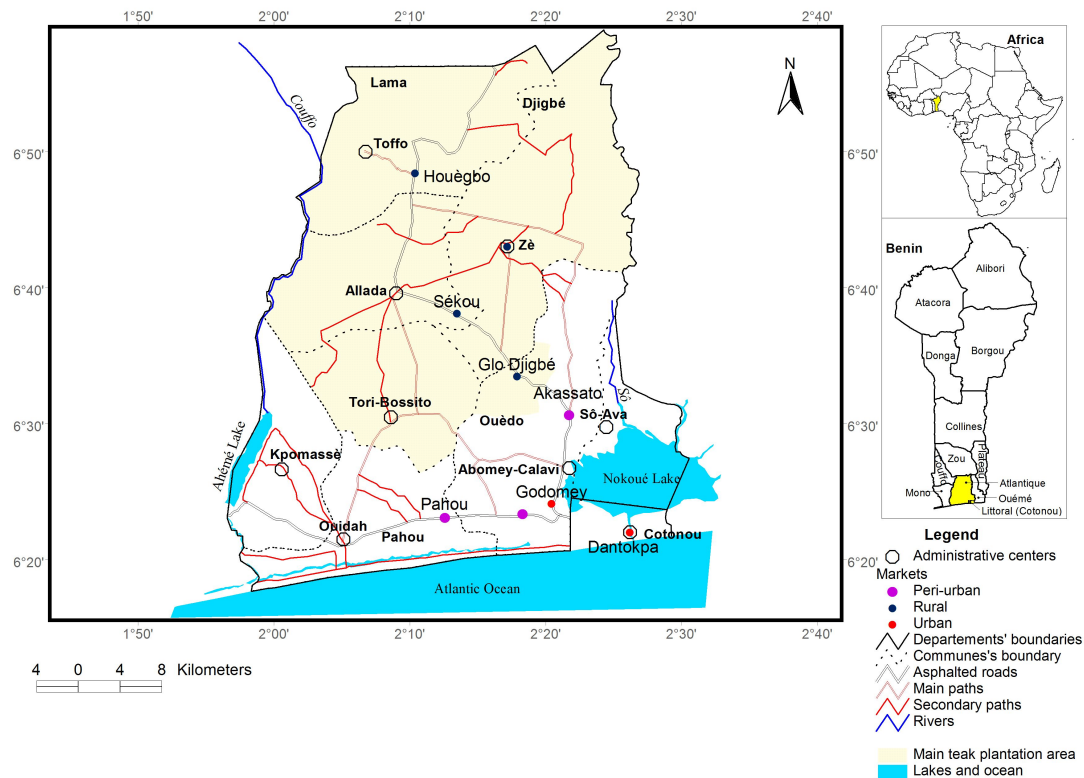


Figure 1: Map of the study region.

Peri-urban markets are connected to transitional areas, between rural and urban regions (17). The first stage was the identification of main production areas in the Atlantique department, namely the districts of Zè, Toffo, Tori-Bossito, Allada, and Abomey-Calavi (Figure 1). The rural/peri-ruban market connected to each production area was selected, so as to understand the organisation of activities at the local level. The rural markets selected were as follows: Houègbo in Toffo district; Sékou in Allada district; the central market of Zè district; and Glo-Djigbé in Abomey-Calavi district (Figure 1). The latter market is also connected to the production area of Tori-Bossito. The selected peri-urban markets included Pahou in Ouidah district; and Akassato and Cococodji in Abomey-Calavi district. Regarding urban areas of consumption, the markets of Godomey in Abomey-Calavi and Dantokpa in Cotonou were selected (Figure 1). To summarise, nine markets were selected: four rural, three peri-urban, and two urban markets (Figure 1).

A survey was carried out across traders in sampled markets from November to December 2011. Each market was visited two consecutive market days. All the traders present in the market were interviewed face-to-face (76 respondents altogether). Traders provided information on their socio-demographic characteristics, the functions performed in the marketing channel (wholesale, retail), the organisation of their activities (collection, transportation, etc.), price setting, quantities of products commercialised, financial data (disaggregated by season), and number of market days per month. Besides traders, semi-structured interviews were conducted among other stakeholders to get a comprehensive understanding of chain functioning. Lastly, a complementary survey on purchase motivations was carried out among consumers in June 2014, based on semi-structured interviews and focus group discussions.

Data processing and results compilation

The first stage consisted in mapping the marketing channel and highlighting all stakeholders. In this framework, traders were typologised based on their functions. Second, a synthesis was done on product flows, units and price settings in the chain. Traders were characterised based on the average quantity of products sold per market day. Last, the revenues from the teak leaves marketing was determined by considering the net margin per market day and the monthly income generated by the activity.

The net margin was determined as follows: $NM = SR - TC$; where SR is the sales revenues, and TC is the total cost. Monthly income was calculated by multiplying the net margin by the number of market days reported by traders. Statistical comparisons were done based on Student's t test, and the analysis of variance (12).

Results

Agents and functions

Five stakeholders were involved in the teak leaves marketing channel in southern Benin: owners of teak plantations, traders, transporters, consumers, and the communes. Teak planters, traders and the consumers were direct agents who had the ownership of the product along the chain (Figure 2) while transporters and the communes were indirect agents involved in the functioning of the marketing system.

Owners of teak plantations

Teak is often planted by smallholders on marginal lands. Farmers' objective is the production of construction timber, especially pole (diameter ranging from 5 to 15 cm). Therefore, leaves are ancillary products of teak plantations.

Traders

Traders were women, aged between 25 and 60 years, and mostly illiterate (96% of respondents). The marketing of teak leaves was generally a secondary activity for traders (70% of respondents) who were engaged in other activities (farming, crafts, marketing of medicinal plants, and marketing of agricultural products).

There were three categories of traders, based on their functions: collectors-retailers, collectors-wholesalers-retailers, and retailers (Figure 2). In this paper, wholesale refers to transactions where the buyer is another trader while retail applies to transactions between traders and end-consumers.

"Collectors-retailers" used to retail directly their products to rural consumers (Figure 2) in rural markets, after handling the harvest of teak leaves themselves. Besides retail sales to rural consumers, the "collectors-wholesalers-retailers" were also engaged in wholesales. In that case, the customers were the retailers who in turn sold the product to end-consumers in the urban markets (Figure 2). The collectors-retailers used to operate in rural markets (Houègbo, Sékou, and Zè), while the collectors-wholesalers-retailers used to operate in peri-urban markets (Akassato, Cococodji, and Pahou). Besides peri-urban markets, collectors-wholesalers-retailers were also operating in the rural market of Glo-Djigbé (Figure 1). The retailers used to operate in urban markets (Godomey and Cotonou).

Consumers

Food sellers (women) were the end-consumers of teak leaves. Food packaging was by far the main consumption form of the product. A diversified range of food was packaged with teak leaves: "akassa", (maize paste), bean cake, wheat paste, smoked fish, "mustard", cassava cake, flat cake of groundnut, soya bean cheese, leafy vegetable, beef meat, etc. (Figure 3). The motivations supporting the purchase of teak leaves were as follows: easy availability of the product, convenience, and affordable price.

Transporters

Transporters were indirect agents not specialised in the teak leaves business, but they intervened in the transfer of the products from one place to another in the marketing channel. Small passenger cars were used to transport teak leaves from peri-urban markets to urban markets, while bikes and motorbikes were involved in the transfer of the product between teak plantations and the rural and peri-urban markets.

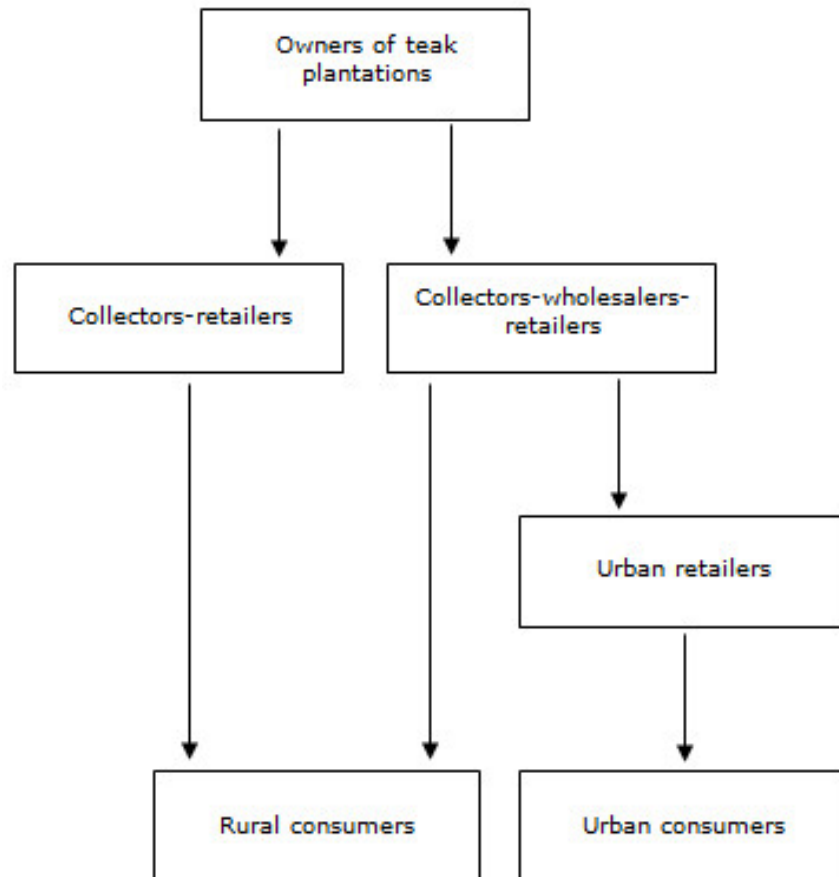


Figure 2: Map of the teak leaves marketing channel in southern Benin.



Figure 3: Maize paste (left) and mustard (right) packaged with teak leaves.

Communes

The communes regulate the functioning of public markets where transactions take place. They collect levies from all traders operating in the markets. The amounts were not proportional to sales volumes, and varied across the municipalities (XOF 50-100 per market day).

Products flows and transactions units

The harvest of teak leaves, the starting point of the marketing channel, was handled by rural traders. This product was harvested by women in the plantation of their relatives (husband, father, or father-in-law). Those who had no relatives owning teak plantations used to source the leaves from a third person's plantation. Sometimes, a small gift of XOF 500-1000 (USD 1-2) is granted to the plantation holders. Teak leaves are also harvested for free in State-owned plantations, according to the clauses of participatory forest management. The flows of teak leaves in the study region occurred at two levels: local consumption in rural areas and the transfer towards urban centres. In rural markets, local consumers used to purchase teak leaves from the collectors-retailers and the collectors-wholesalers-retailers. Product flow to urban markets was from plantation areas towards the cities of Abomey-Calavi, Cotonou and Ouidah, via peri-urban markets (Figure 1).

Bunches were used as units in wholesales transactions between rural collectors-wholesalers-retailers and urban retailers (Figure 4). The volume of bunches varied greatly, resulting in heterogeneity in the price. They weighed on average 27.5 kg with a standard deviation of 12.0 Kg. In peri-urban markets, the collectors-wholesalers-retailers applied a unit price of XOF 900-1000 (USD 1.8-2.0) per bunch during the study period. Likewise, a diversified range of units was used in retail transactions. These varied across markets, but variations were also found in a given market (Figure 4). The retail price ranged between XOF 150 and 400 (USD 0.3-0.8), according to bunches volume.

Quantity of products and revenues from teak leaves marketing

Quantity of products commercialised

The average quantity of teak leaves commercialised by traders per market day ranged between 44 and 83 kg, and 47 and 95 kg, during the rainy season and the dry season, respectively (Table 1). The figures of the dry season were higher, compared to the rainy season whichever the type of trader (Table 1); but the differences were not significant (Student's t test; all $p > 0.05$). The quantity of leaves commercialised per market day in the retail market varied consistently according to the type of traders whichever the season considered (Table 1). Urban retailers were selling a higher quantity of product, compared to the rural traders (collectors-retailers and collectors-wholesalers-retailers).

That difference stems from the fact that urban retailers were operating in a larger market. Their strategy consisted in buying teak leaves from several "collectors-wholesalers-retailers" to meet urban consumers' demand.

Income from teak leaves marketing

The net margin per market day varied between XOF 777 and XOF 2,655 (USD 1.6-5.3) during the rainy season, and between XOF 1,104 and XOF 3,609 (USD 2.2-7.2) during the dry season (Table 2). The monthly revenue ranged between XOF 4,659 and XOF 15,927 (USD 9.3-31.9) during the rainy season, and between XOF 6,621 and XOF 21,655 (USD 13.2-43.3) during the dry season (Table 2). The net margin per market day varied across trader types (Table 2). Likewise, the monthly revenue varied consistently across trader types whichever the season considered (Table 2). Urban retailers' revenue was higher, compared to rural traders' (collectors-retailers, and collectors-wholesalers-retailers). Moreover, revenues were generally higher in the dry season, compared to the rainy season (Tables 2), even though these differences were not significant (Student's t test, all $p > 0.05$).



Figure 4: Diversity of units in the marketing system.

Table 1

Quantity of teak leaves commercialised by traders per market day in different seasons.

Types of trader	Quantity of teak leaves commercialised (kg)	
	Rainy season	Dry season
Collectors-retailers	44 a*	47 a
Collectors-wholesalers-retailers	53 a	61 a
Retailers	83 b	95 b

*: Figures followed by different letters in the same column are significantly different at 5% level.

Table 2

Traders' net margin in different seasons (XOF).

Types of trader	Net margin per market day		Monthly revenue	
	Rainy season	Dry season	Rainy season	Rainy season
Collectors-retailers	777 a*	1104 a	4659 a*	6621 a
Collectors-wholesalers-retailers	850 a	1340 a	5100 a	8040 a
Retailers	2655 b	3609 b	15927 b	21655 b

* Data followed by the same letter on a given column are not significantly different at 5% level (ANOVA, Least Significant Difference).

Discussion

Characteristics of the marketing system

The marketing system of teak leaves in southern Benin was relatively short, with two major middlemen groups: rural and peri-urban traders (at the beginning of the channel) and urban retailers. This shortness is consistent with the absence of any significant transformation from harvest through delivery to end-consumers. Shortness seems to be a frequent pattern of local markets of non timber forest products (30). Similar examples in Benin include the medicinal plant marketing channel (34), and the *Pentadesma butyracea* almond marketing channel (4). In the particular case of the teak leaves marketing in southern Benin, the perishability of the product justifies the quick transfer to end-consumers, hence the small number of middlemen.

The teak leaves marketing channel in southern Benin operates through a network of markets with specialisation per function in respect of their geographical pattern: rural - peri-urban - urban gradient. Rural markets were specialised in retail trade to rural consumers; peri-urban markets combined retailing to consumers and wholesale transactions between traders. Urban markets were specialised in retail trade to urban consumers. The presence of collectors-wholesalers-retailers in the rural market of Glo-Djigbé (Figure 1) highlights ongoing changes in this area which is being transformed from rural to peri-urban. The predominant location of wholesale transactions in peri-urban markets stems from the fact that these markets are closer to urban end markets and are connected by good roads. Given that transportation is a key component of marketing costs which depend on road quality and distance (31), the choice of these markets by urban retailers for consignment sourcing enabled them to minimize transport costs, thanks to proximity and good road conditions.

The heterogeneity of units (bunch size) in this marketing channel represents a common feature with most rural products channels in Sub-Saharan Africa (10). However, this does not seem to be an

impediment for consumers, owing to the fact that price bargaining occurs in all transactions. Overall customers had the perception that the current price setting is affordable, compared to polyethylene bags, the substitute product.

Importance of women in the settlement of the marketing channel

The valorisation of teak leaves was led by women who performed all marketing functions. This result is consistent with previous studies showing the predominance of women in the marketing channel of non-timber forest products in Benin. These include the marketing channel of *Pentadesma butyracea* in central Benin (4) and the marketing channel of medicinal plants in southern Benin (34). Likewise, in the marketing system of agricultural products in Benin and Malawi, small traders included predominantly women (10). The predominance of women in NTFP business stems from the low capital requirement of these marketing activities. In the case of the teak leaves marketing system, a capital of XOF 1000 (USD 2) is enough to begin the activity. The predominance of women among small traders also highlights the constraint of capital to engage in larger trade activities. Interestingly, teak leaves commercialisation is a part-time activity for women with free entry and exit, depending on other opportunities.

Potential for environmental sustainability and livelihood improvement

The use of teak leaves for food packaging (substitute of non biodegradable polyethylene bags) offers the opportunity to tackle environmental pollution, at least partly. Therefore, the marketing of this product could be linked to the region's green economy defined as "economic activity with the goal of reducing energy consumption or improving environmental quality" (8). Decision makers could take advantage of this opportunity by advertising the interests of teak leaves, compared to non biodegradable polyethylene bags. Consumers' motivations (easy availability, convenience, and affordable price of teak leaves) confirm their good perception about the product.

The commercialisation of teak leaves contributes to livelihoods diversification in rural households. According to traders, this business is helpful to address household and personal needs (e.g., food, social commitments, participation in savings groups, etc.). Therefore, this result supports previous reports, regarding the contribution of non timber forest products to the livelihoods of rural people, especially women (1, 29). Regarding the affordability of product price, further studies are needed to assess the savings achieved by consumers through the use of teak leaves, compared to polyethylene bags.

The study shows that besides timber, smallholder forestry can generate additional monetary benefits. Although teak leaves revenues do not go to farmers, this contributes to households livelihoods, given that rural traders at the beginning of the channel are mostly planters' wives or relatives. Moreover, teak leaves generate income along the production cycle, while timber harvest occurs once in 3-5 years (rotation age). These results support (15) who reported that on-farm tree growing based on non-timber products had the highest commercialisation rates while timber plantations were the least successful in Latin America. A similar success has been also reported in Vietnam (26). Therefore, the proper selection of tree species to promote in smallholder forestry is a critical issue that could be achieved by consulting beneficiaries prior to farm forestry programmes.

Conclusions

The focal target of this study is to analyse the marketing system of teak leaves in southern Benin, to highlight the potential of this product, as a driver of increased income in smallholder forestry, and improved livelihoods.

Teak leaves are used for food packaging as substitute for polyethylene bags.

The commercialisation channel consisted of a network of markets specialised in different functions in respect of their geographical patterns: rural, peri-urban, and urban markets. Rural markets were specialised in retail trade to rural consumers; peri-urban markets combined retail to consumers and wholesale transactions between traders. Urban markets were specialised in retail trade to urban consumers.

The marketing system was dominated by women who controlled the main functions. Three categories of traders were encountered, based on their functions: collectors-retailers, collectors-wholesalers-retailers, and retailers. Besides traders and the consumers, other chain stakeholders include plantation owners, transporters and the communes.

The commercialisation of teak leaves generates income for traders, and increases the return from tree growing. The promotion of the use of teak leaves for food packaging as substitute for non biodegradable polyethylene bags offers the opportunity for policy makers to tackle environmental pollution while supporting rural women. The study shows the necessity to consult beneficiaries for the proper selection of tree species in farm forestry programmes. The assessment of the savings achieved through the use of teak leaves as substitutes for polyethylene bags is a relevant research path to support decision making.

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