Research Application Summary

Biodiversity and cultural importance of wild edible trees in Benin (West Africa)

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Abstract

The present research aimed at assessing the biodiversity of wild edible trees and cultural values that support their maintenance in the traditional agroforesty systems of Benin. A number of selected sites in each of the 3 climatic zones of the country were surveyed and data were collected through a field exploration and a semi-structured survey among 435 selected households throughout the country, using a questionnaire. A total of 43 wild edible trees were found in the traditional agroforestry systems of Benin. Three main reasons support peasant ambition to conserve or to grow wild edible trees in their field. The first one is the contribution of species as food followed by its use in traditional medicine and ceremonies. Another important reason supporting the choice to conserve wild edible trees in traditional agroforestry is the farmer's perception of the availability of species in natural vegetation. At the end, cultural communities' based conservation of wild edible trees has been discussed.

Key words: Underutilsed trees, biodiversity, social value, agroforestry systems, ethnic groups, conservation, West Africa

Résumé

La présente étude avait pour objectif d'évaluer la biodiversité des espèces ligneuses alimentaires et les valeurs culturelles qui déterminent leur maintien au niveau des systèmes agraires au Bénin. Des sites ont été sélectionnés dans les 3 zones climatiques du Bénin et les données ont été collectées à travers des explorations au niveau des systèmes agroforestiers. Des enquêtes semi-structurées ont été également réalisées auprès de 435 ménages distribués dans tout le pays. Au total 43 espèces ligneuses alimentaires ont été inventoriées dans les systèmes agroforestiers traditionnels. Trois principales raisons expliquent la conservation de ces espèces par les populations locales. Les deux premières raisons sont les utilisations alimentaire et médicinale des espèces suivies de la perception qu'ont les populations sur leur disponibilité dans ses habitats naturels. Enfin,

les stratégies de conservation endogènes de ces espèces basées sur leur valeur culturelle ont été discutées à travers le document.

Mots clés: Arbres sous valorisées, biodiversité, valeur sociale, systèmes agroforestiers, groupes ethniques, conservation, Afrique de l'Ouest

Background

Land use changes associated to agriculture and livestock have modified natural ecosystems of arid zones, creating complex landscapes with patches of transformed and untransformed areas (Shachak *et al.*, 2005; Kyndt *et al.*, 2009). These systems are full of indigenous species that provide important environmental services or economically valuable products traditionally obtained from natural forest (Leakey and Simons, 1998). Indeed, wild food plants play a very important role in the livelihoods of rural communities (Assogbadjo *et al.*, 2008). They serve as alternatives to staple food during periods of food deficit (Vodouhê *et al.*, 2009) and are also one of the primary alternative sources of income for many rural communities (Fandohan *et al.*, 2010). Ecological and genetic studies have established important bases for understanding the natural history and functioning principles of natural arid ecosystems (Shachak *et al.*, 2005; Assogbadjo *et al.*, 2006). In contrast, few studies analysed the cultural values that support the conservation of wild edible trees in the parklands systems by local communities. However, to date, rising population pressures have resulted in clearance of forested land for cultivation in all African's countries. Consequently, most of the agroforestry trees species as well as the cultural and endogenous knowledge related to them are facing a very high risk of extinction. To fill in this gap, the present research aimed at assessing the biodiversity of wild edible threes and their cultural importance in the traditional agroforestry systems of Benin.

Literature Summary

Traditional agroforestry systems are the result of a long evolutionary process during which an association between natural elements such as trees and shrubs share the same stands with crops and sometimes with households (Kyndt *et al.*, 2009). These systems are filled with indigenous species that provide important environmental services or economically valuable products traditionally obtained from natural forest (Leakey and Simons, 1998). Indeed, wild food plants play a very important role in the livelihoods of rural communities. They serve as alternatives to staple food during periods of food deficit (Asfaw

and Tadesse 2001; Vodouhê *et al*., 2009) and are also one of the primary alternative sources of income for many rural communities (Shrestha and Dhillion, 2006). These communities depend on them mainly for herbal medicines, food, forage, construction of dwellings, making household implements, beds and sleeping mats, and for firewood and shade (Gemedo-Dalle *et al.*, 2005; Vodouhê *et al.*, 2009). Moreover, such plants are valuable genetic resources that can be used for new crop species development (Atangana *et al.*, 2002; Dhillion *et al*, 2004). However, in general, little is known on wild food plants diversity, the reasons supporting their incorporation in agroforestry systems and local communities' preferences about morphological traits of integrated species. These data are useful to enhance agroforestry's capacity to fulfil its potential and to secure long-term generation of food resources. There are also needed to support conservation of plant diversity, as well as sources of species that may be domesticated (Shrestha and Dhillion, 2006).

Study Description

The study was conducted in the three climatic zones of Benin (114 622 km^2 and 6.752.569 inhabitants in 2002), located between 6° and 12°50 N and 1° and 3°40 E in West Africa. The zones studied were: the Sudanian zone located between 9°45' - 12°25' N, the Sudano-Guinean zone located between 7°30' - 9°45' N and the sub-humid Guinean zone (Dahomey Gap) located between 6°25' - 7°30' N. Within each climatic zone, the ethnobotanical surveys consisted in an assessment of the farm diversity of wild food species and socio-economical factors that support farmers' choice for the species used in these systems. Data were collected through a field exploration and a semi-structured survey among 435 selected households throughout the country, using a questionnaire. The most culturally important species as ranked by locals were determined for each climatic zone and the relations between the targeted species in traditional agroforestry systems and the reasons which support peasants' choices were described.

Research Application

A total of 43 wild edible trees (24 families) were present in the traditional agroforestry systems in Benin during the survey (Table 1). The most represented family was Leguminosae (seven species), followed respectively by Annonaceae, Sapotaceae, Sterculiaceae (four species), Anacardiaceae (three species), Rubiaceae and Verbenaceae (two species). Seventeen families were represented by only one species. Traditional agroforestry systems in Guinean zone turned out to be the most

Table 1. Biodiversity, distribution and major uses of wild edible tree species in the traditional agroforestry systems of Benin.

N°	Species	Botanical family	Climatic zones	Uses
1	*Adansonia digitata*	Bombacaceae	G, Sg, S	1, 2, 3, 4
2	*Annona senegalensis*	Annonaceae	G, Sg, S	1, 2
3	*Balanites aegyptiaca*	Balanitaceae	S	1,2,3
4	*Blighia sapida*	Bignoniaceae	G, Sg, S	1, 2, 4
5	*Bombax costatum*	Bombacaceae	Sg, S	1,2,3
6	*Borassus aetiopum*	Arecaceae	G, Sg, S	1, 2, 3, 4, 5
7	*Brillantaisia madagascariensis*	Acanthaceae	G	1, 1
8	*Carpolobia lutea*	Polygalaceae	G	1, 2
9	*Chrysophyllum albidum*	Sapotaceae	G	1, 2
10	*Cola acuminata*	Sterculiaceae	G	1,2, 3
11	*Cola gigantea*	Sterculiaceae	G	1
12	*Cola millenii*	Sterculiaceae	G, Sg	1
13	*Cola nitida*	Sterculiaceae	G	1, 2, 3
14	*Deinbollia pinnata*	Sapindaceae	G	1, 2
15	*Detarium microcarpum*	Leguminosae	S	1,2
16	*Dialium guineense*	Leguminosae	G	1, 2
17	*Diospyros mespiliformis*	Ebenaceae	G, Sg, S	1, 2, 3, 4, 5
18	*Ficus sp*	Moraceae	S	1, 2
19	*Garcinia kola*	Clusiaceae	G	1, 2
20	*Gardenia erubescens*	Rubiaceae	Sg, S	1, 2
21	*Irvingia gabonensis*	Irvingiaceae	G, Sg	1, 2, 4
22	*Lannea microcarpa*	Anacardiaceae	S	1,2,3
23	*Mimusops andongensis*	Sapotaceae	G	1
24	*Monodora myristica*	Annonaceae	G	1, 2, 3
25	*Parkia biglobosa*	Leguminosae	G, Sg, S	1, 2, 3, 4, 5
26	*Picralima nitida*	Apocynaceae	G	1
27	*Piliostigma thonningii*	Leguminosae	G	1, 2
28	*Psidium guajava*	Myrtaceae	G, Sg	1, 2
29	*Pterocarpus santalinoides*	Leguminosae	G	1, 2
30	*Sclerocarya birrea*	Anacardiaceae	S	1,2
31	*Spondias mombin*	Anacardiaceae	G, Sg	1, 2
32	*Strychnos sp*	Loganiaceae	S	1,2
33	*Synsepallum dulcificum*	Sapotaceae	G	1
34	*Tamarindus indica*	Leguminosae	Sg, S	1, 2, 3, 4
35	*Tetrapleura tetraptera*	Leguminosae	G	1
36	*Uapaca togoensis*	Euphorbiaceae	S	1, 2
37	*Uvaria chamae*	Annonaceae	G	1
38	*Vitellaria paradoxa*	Sapotaceae	Sg, S	1, 2, 3, 4, 5
39	*Vitex doniana*	Verbenaceae	G, Sg, S	1, 2, 3, 4
40	*Vitex simplifolia*	Verbenaceae	S	1, 2
41	*Ximenia americana*	Olacaceae	Sg, S	1, 2, 3, 4
42	*Xylopia aethiopica*	Annonaceae	G	2, 4
43	*Ziziphus abyssinica*	rhamnaceae	S	1, 2

Legend: G = Guineo-Congolian zone; Sg = Sudano-Guinean zone, S = Sudanian zone. For uses: Food = 1; Medicine = 2; Ceremony = 3; Food processing = 4; Other use = 5.

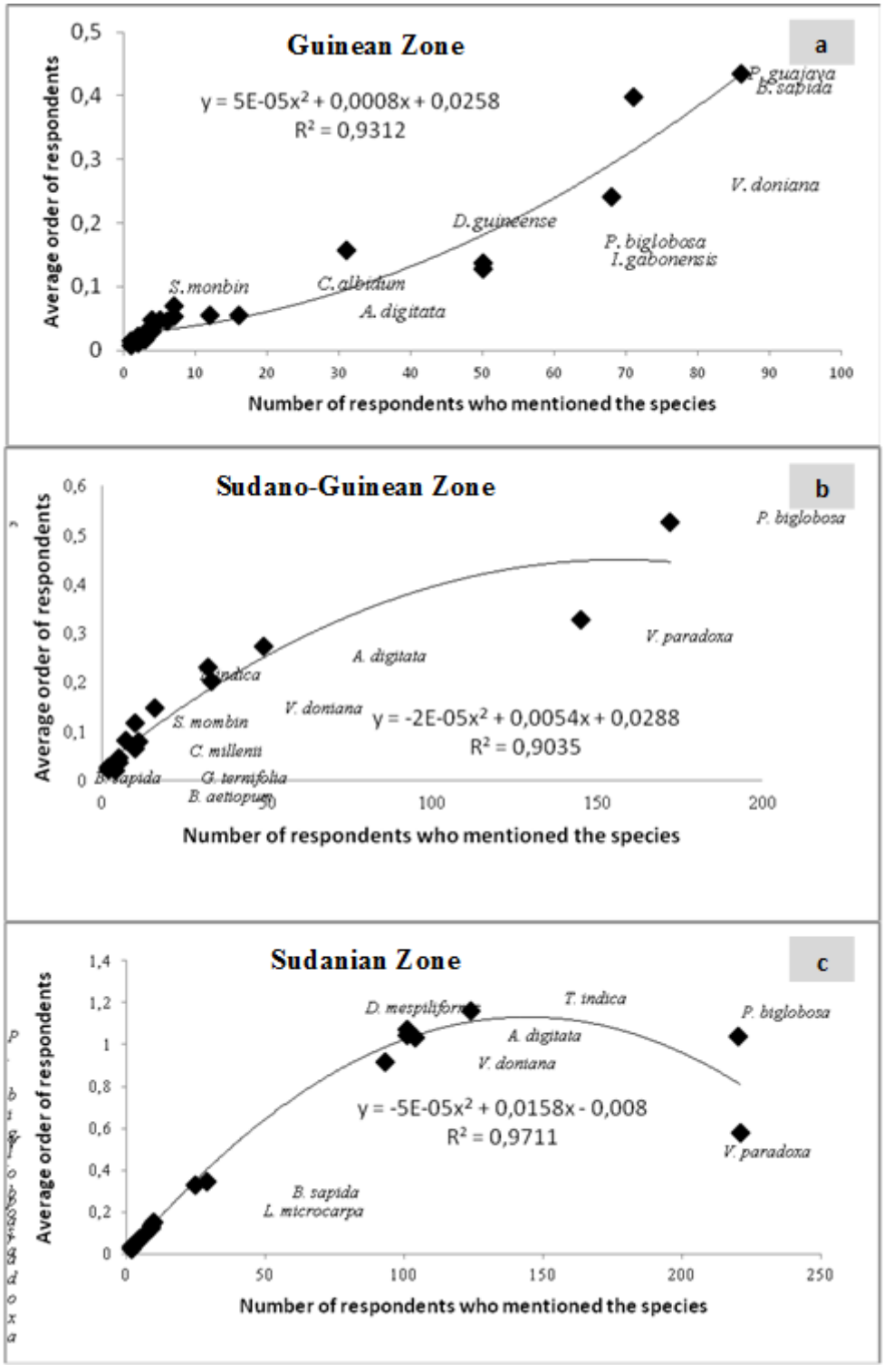

Figure 1. Most culturally important wild edible trees in traditional agroforestry systems in Benin.

diversified with 29 species (17 families) followed by Sudanian zone with 22 species (16 families) and Sudano-Guinean zone with 16 species (14 families). The common species to the three climatic zones are *Adansonia digitata*, *Annona senegalensis*, *Blighia sapida*, *Borassus aethiopium*, *Diospyros mespiliformis*, *Parkia biglobosa* and *Vitex doniana*. The most frequent species (cited by at least 20% of participants) were *Psidium guajava*, *Blighia sapida*, *Vitex doniana*, *Irvingia gabonensis*, *Parkia biglobosa* and *Dialium guineense* in Guinean region, *Parkia biglobosa*, *Vitellaria paradoxa* and *Adansonia digitata* in Soudano-Guinean region and *Vitellaria paradoxa*, *Parkia biglobosa*, *Tamarindus indica*, *Borassus aethiopum* and *Diospyros mespiliformis*, *Adansonia digitata* and *Vitex doniana* in Sudanian region (Fig. 1a, b, c). The study showed that the most culturally important wild edible trees in traditional agroforestry systems in the Guinean zone (*Psidium gujava*, *Blighia sapida* and *Vitex doniana*) were different from those identified in Sudanian and Sudan-Guinean zones (*Parkia biglobosa* and *Vitellaria paradoxa*) (Fig. 1a, b, c). Therefore people from Guinean zone valorised different species compared with people from Sudano-Guinean and Sudanian zones. A number of both native and exotic wild edible trees were found in the traditional agroforestry systems with the dominance of indigenous tree species (98.5 %). The most culturally important wild edible trees were indigenous except *Psidium guajava* species.

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