

Full Length Research Paper

Diversity of life-forms within Sapindaceae Juss. in West Africa and Western Cameroon: A field guide

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Received 23 May, 2014; Accepted 21 August, 2014

One of the major challenges faced by biologist during field studies is the identification of plant species and this is most evident in the tropics where biodiversity richness is very high. Hence this study was conducted in order to document and produce a guide for the identification of the diversity of life forms that represents the family Sapindaceae in West Africa. In view of this, plant exploration was carried out in five West African countries with the aim of collecting and recording the different life forms in the family Sapindaceae as well as their specific locations. This revealed that Sapindaceae are widely distributed in West Africa and the highest number of species was recorded in Nigeria (47 taxa). A total of 104 species was recorded in the region and these are represented by diverse life forms ranging from trees (58 species) to shrubs (32 species) and climbers (4 species) with compound trifoliolate (e.g. *Allophylus*), paripinnate (e.g. *Deinbollia*) or imparipinnate (e.g. *Paullinia*) leaves. Flowers are arranged in groups either as cymes or racemes. Fruits are in the form of berry (e.g. *Melicoccus*), capsules (e.g. *Blighia*) or drupes (e.g. *Deinbollia*); some are inflated (e.g. *Cardiospermum*) or trilobed and woody (e.g. *Chytranthus*). This study provides a guide to field identification of members of the family Sapindaceae in West Africa and can be seen as a step in solving taxonomic identification problems and biodiversity conservation as a whole.

Key words: Conservation, distribution, identification, Sapindaceae, West Africa.

INTRODUCTION

The family Sapindaceae Juss., is one of the families in the order Sapindales and can be divided into 5 or 6 subfamily depending on the treatment. Most Sapindaceae are large emergent trees or erect shrubs however some are tendril lianes (Acevedo et al., 2011). They are comprised of about 140-150 genera with 1400-2000 species worldwide. Many of these are lactiferous, that is, they contain milky sap, and many contain mildly toxic saponins with soap-like qualities in the foliage

and/or the seeds or roots. Approximately one-third of the members of the family are found in the tribe Paullineae. Members include economic plants which are largely used as lumber trees or oil seed crops although some are edible.

The majority of species are native to Asia, although there are a few in South America, Africa and Australia (APG II, 2003). They occur in temperate to tropical regions throughout the world with about 18 (Hutchinson

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Table 1. Sites visited for plant collection.

| Country | Herbarium | Botanic Gardens | Forest Reserve/ National Parks |
|------------------------|--|---|--|
| Nigeria | University of Lagos (LUH), Lagos | University of Lagos, Lagos Ahmadu Bello University, Zaria | Olokemeji, Ibadan |
| | University of Ibadan (UIH), Ibadan | | Aponmu, Ondo |
| | Bayero University (BUH), Kano | | Owena, Ondo |
| | Ahmadu Bello University (ABU), Zaria | | Idanre hills, Ondo |
| | Forestry Herbarium Ibadan (FHI) | | Omo, Ogun |
| Cameroon | University of Benin | Limbe Botanic Gardens SABOGA, Bamenda | Sakponba, Benin |
| | National Herbarium of Cameroon, (HCN) Yaounde | | Edondon Community forest, Obubra. |
| | Limbe Botanic Gardens | | Cross River National Park, Erokut Station |
| | | | Awi, Cross river |
| Ghana | | Aburi botanic garden University of Ghana, Legon | Bakingili, Limbe |
| | University of Ghana (GC), Legon | | Bimbia/Mabeta, Limbe |
| | Forestry Research, Achimota | | Buea Mountains |
| Togo Ivory Coast | | | Likombe, Buea |
| | Lome | | Oku Elak, Oku |
| | | | Bali Ngemba, Bali |
| | | | Achimota community forest |
| | | | Bia |
| | | | Legon hills |
| | | | Lome |
| | | | d'IDERT |

and Daziel, 1958) to 26 (Adeyemi and Ogundipe, 2012) genera in west tropical Africa and 13 (Keay et al., 1964) to 18 (Adeyemi and Ogundipe, 2012) species in Nigeria.

Sapindaceae are recognizable by their often spiral, alternate, simple, or more commonly pinnately compound leaves that often have sub-opposite leaflets and a terminal rachis tip. Most often they are pollinated by birds or insects, with a few species pollinated by wind (Singh, 2004). The fruits are fleshy or dry. They may be nuts, berries, drupes, schizocarps, capsules (*Bridgesia*), or samaras (*Acer*) often red, containing seeds (Heywood, 1978). The embryos are bent or coiled, without endosperm in the seed, but frequently with an aril (Singh, 2004). Members of the family Sapindaceae are one of the most important forest species to be conserved and valued in Africa due to their multiple uses, high nutritional content and medicinal value. Globally, biodiversity is being threatened by climate change as well as human activities and this has aroused concerns about their conservation status. Hence, this current study is designed as an effort to aid in the conservation and identification of this plant family in Western Africa. Our aim is to explore the diversity of family Sapindaceae in West Africa, with emphasis on the collection, identification and preservation of the collected plant specimens as well as production of a field guide for field identification purposes.

METHODOLOGY

Study area

The study was carried out in the western part of tropical Africa and five countries were visited namely: Nigeria, Ghana, Togo, Ivory Coast and western Cameroon. The study area is characterized by tropical rain forest and prominent water bodies. The land is plain lying less than 300 m above sea level, though isolated high points exist in some areas.

Sample exploration

The national herbaria as well as local herbaria were visited so as to observe the samples in the repositories, take necessary morphological data from each of the samples and collect some of the samples examined where permission is given to do so. The visit provided information on the last location in which the sample was recorded in the region and this informed our decision on where to collect samples in the field.

Consequently, various national parks, forest reserves and botanic gardens were visited in West Africa for the collection of fresh samples of the plant specimens. Permission was obtained from the various authorities involved in each region in order to collect samples from the reserves.

Access to the reserves was possible only through the use of a 4x4 wheel drive vehicles and motorcycles due to the rugged and untarred nature of the roads. Some reserves could only be assessed by trekking some distances of up to 40-50 km as the case may be. A list of the herbaria and reserves visited is shown in Table 1.

Preservation and identification of samples

Preliminary identification was achieved with the aid of floras including that of Hutchinson and Daziell (1958), Fouilloy and Hallé (1973) and Cheek et al. (2000). For preparation of voucher specimens, a part (usually branch) of each plant sample was placed in between each old newspaper and this was kept in a plant press. The press was tied with twines and kept in the dryer for two days in order to prevent the decomposition of the plant material. Each of the dried specimens was then removed from the newspaper and mounted on white cardboard papers using white gum (glue). Label was attached to each of the herbarium specimen in order to give a full description of the plant, its location, the date of collection and the name of collector. This was then authenticated at the Forestry Herbarium, Ibadan and deposited at the University of Lagos Herbarium for reference purposes.

Data analysis

Data obtained was analyzed using Shannon and Wiener indices following Ubom (2010) Magurram (1988) and Kent and Coker (1985). The Shannon and Wiener Diversity Index, which accounts for species richness and how the species are distributed, is derived from the relation:

$$H1 = - \sum Pi \ln Pi$$

$$I = 1$$

Where: H1 = Shannon-Weiner index; S = number of species; Pi = proportion of individuals or abundance of the i^{th} species expressed as a proportion of the total number of individuals of all species; $\ln = \log \text{base}10$.

RESULTS

Sample exploration was carried out across five African countries and 35 plant species were collected from the field (Table 2) while 69 species were retrieved from the herbarium (Table 3), identified and authenticated at the Forestry Herbarium Ibadan. Our sampling revealed that Sapindaceae are widely distributed in West Africa being represented by 26 genera and 104 species. Of these species, 4 are climbers 32 are shrubs and 58 are trees representing 3.84, 30.76 and 65.38% of the total number of species, respectively. The largest population was recorded in the southern highlands of Nigeria (47 taxa), western region of Cameroon (45 taxa) and western and eastern River banks in Ghana (25 taxa) (Figure 1); however, taxa shared are highest between Nigeria and Cameroon. Leaf, stem, fruit and flower samples were collected and photographs were taken (Plate 1). Also, GPS coordinate of each sample was recorded and inputted into a map (Figure 2). Voucher samples of samples collected from the field have been deposited at the University of Lagos Herbarium (LUH) Nigeria.

Diverse life forms were encountered ranging from trees (*Aporrhiza* Radlk., *Blighia* Koenig, *Chytranthus* Hook. f., *Deinbollia* Schumach. and Thonn., *Dodonaea* L., *Eriocoelum* Hook. f., *Ganophyllum* (Chev.) Hauman., *Lecaniodiscus* Planch. ex Benth., *Lepisanthes* Blume, *Lychnodiscus* Radlk., *Majidea* J. Kirk ex Oliv., *Melicoccus*

P. Browne., *Nephelium* L., *Placodiscus* Radlk., *Radlkofera* Gilg., *Sapindus* L. and *Zanha* Hiern.), to shrubs (*Allophylus* L., *Glenniea* Hook. f., *Haplocoelum* Radlk., *Harpullia* Roxb., *Laccodiscus* Radlk. and *Pancovia* Willd.) and climbers (*Cardiospermum* L. and *Paullinia* L.) as shown in the appendix below. They possess compound trifoliate (For example *Allophylus*), paripinnate (for example, *Chytranthus*) or imparipinnate (example, *Paullinia*) leaves with an exception of *Dodonaea* which has simple leaves. Most species have leaves with entire margin but some possess serrated margins (example, *Allophylus* and *Cardiospermum*). The leaf surface is papery and glossy as in *Pancovia*, glabrous as in *Allophylus africanus* or pubescent as in *Laccodiscus ferrugineus* and *Allophylus hirtellus*. Flowers are arranged in groups either as cymes or racemes. Fruits are in the form of berry (example, *Melicoccus*), capsules (example, *Blighia*) or drupes (example, *Deinbollia*); some are inflated (example, *Cardiospermum*) or trilobed and woody (example, *Chytranthus*). The percentage number of samples collected per genera is shown in Table 4 while the number of life forms is shown in Figure 3.

DISCUSSION

Most of the samples collected from the field were found in Cameroon, due to the presence of large area of conserved forest, that is, 24 samples, followed by Nigeria (14 samples). Only 5 samples each was found in the other three countries visited: Ghana, Togo and Ivory Coast. However, the forestry herbarium in Nigeria houses the largest number of taxa (33) of all the herbarium visited. Taxa shared were highest between Nigeria and Cameroon with 9 taxa endemic to the mountains. A key item in the conservation of biodiversity is identification of species and this could be challenging especially in field studies. Over the years, this has been made difficult by the fast rate of disappearance of species largely as a result of changes in the climate as well as a wide range of unsustainable human activities hence the need for this study. All the observations made in this study are consistent with earlier description of the family given by Heywood (1978), Singh (2004), Acevedo-Rodríguez et al. (2011) and Adeyemi et al. (2013). With exception of a few species, members of Sapindaceae were largely found in lowland forest. Most of the taxa are native to the region with exception to *Melicoccus bijugatus* and *Nephelium lappaceum* which are exotic species. Also, 11 of the species encountered are yet to be identified at the species level due to absence of fruiting structures in the samples.

Several authors, including Alamu and Agbeja (2011) and Pelemo et al. (2011), have highlighted the main drivers of deforestation to include agriculture, logging and mining, use of fuel wood and logging all of which pose threats to biodiversity

Table 2. Samples collected in the field and their locations.

| Species | Locations | Collector(s) | Voucher ID |
|---|--|--------------------------------|------------|
| <i>Allophylus africanus</i> P. Beauv. | Olokemeji and Bakingili forest reserves | Adeyemi, T.O and Ogundipe, O.T | LUH 1194 |
| <i>Allophylus bullatus</i> Radlk. | Buea Mountain | Adeyemi, T.O | LUH1185 |
| <i>Allophylus hirtellus</i> (Hook. f.) Radlk. | Bakingili forest reserve | Adeyemi, T.O | LUH 1190 |
| <i>Allophylus</i> sp | Bakingili forest reserve | Adeyemi, T.O | LUH 3441 |
| <i>Allophylus spicatus</i> Radlk. | Olokemeji forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 3442 |
| <i>Allophylus ferrugineus</i> Taub. | Bakingili forest | Adeyemi, T.O | LUH 1192 |
| <i>Blighia sapida</i> Koenig. | Oshodi Lagos, Limbe Botanic Gardens, Bakingili, University of Ghana and Idanre hills forest | Adeyemi, T.O and Ogundipe, O.T | LUH 1196 |
| <i>Blighia unijugata</i> Bak. | Sakponba forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 3443 |
| <i>Cardiospermum grandiflorum</i> Sw. | Owena and Idanre hills forest reserves | Adeyemi, T.O and Ogundipe, O.T | LUH 1196 |
| <i>Chytranthus macrobotrys</i> (Gilg) Exell and Mendonca. | Bimbiam/Mabeta forest reserve | Adeyemi, T.O | LUH 1187 |
| <i>Chytranthus setosus</i> Radlk. | Bimbiam/Mabeta and Bakingili forest reserves | Adeyemi, T.O | LUH 3444 |
| <i>Chytranthus</i> sp. i | Bakingili forest reserve | Adeyemi, T.O | LUH 3445 |
| <i>Chytranthus</i> sp. ii | Bakingili forest reserve | Adeyemi, T.O | LUH 3446 |
| <i>Chytranthus talbotii</i> (Bak.) Keay | Sakponba and Aponmu forest reserves | Adeyemi, T.O and Ogundipe, O.T | LUH 3447 |
| <i>Deinbollia</i> sp. | Bimbiam forest reserve | Adeyemi, T.O | LUH 3448 |
| <i>Eriocoelum macrocarpum</i> Gilg. ex Radlk. | Limbe Botanic Gardens | Adeyemi, T.O | LUH 1195 |
| <i>Laccodiscus ferrugineus</i> (Bak.) Radlk. | Bakingili, Bimbiam/Mabeta and Omo forest | Adeyemi, T.O and Ogundipe, O.T | LUH 1183 |
| <i>Lecaniodiscus cupanioides</i> Planch. | Olokemeji, Sakponba and Idanre hills forest | Adeyemi, T.O and Ogundipe, O.T | LUH 3451 |
| <i>Majidea fosterii</i> (Sprague) Radlk. | Limbe Botanic Gardens | Adeyemi, T.O and Ogundipe, O.T | LUH 1718 |
| <i>Glennia africanus</i> (Radlk.) Leenh. | Aponmu forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 3449 |
| <i>Pancovia atrovioleaceus</i> | Bakingili forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 1182 |
| <i>Pancovia floribunda</i> Pellegrin. | Calabar | Adeyemi, T.O | LUH 12061 |
| <i>Pancovia</i> sp. i | Bimbiam/Mabeta forest reserve, | Adeyemi, T.O and Ogundipe, O.T | LUH 1188 |
| <i>Pancovia</i> sp. ii | Bimbiam/Mabeta forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 1186 |
| <i>Pancovia</i> sp. iii | Buea/Likombe forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 3453 |
| <i>Paullinia pinnata</i> L. | Limbe Botanic Gardens, Bimbiam/Mabeta forest | Adeyemi, T.O | LUH 1193 |
| <i>Placodiscus leptostachyus</i> Radlk. | Bimbiam/Mabeta forest reserve | Adeyemi, T.O | LUH 3454 |
| <i>Placodiscus</i> sp. i | Bimbiam/Mabeta forest reserve | Adeyemi, T.O | LUH 3455 |
| <i>Placodiscus</i> sp. ii | Aponmu forest reserve | Adeyemi, T.O and Ogundipe, O.T | LUH 3456 |
| <i>Radlkofera calodendron</i> Gilg. | Bimbiam/Mabeta forest reserve | Adeyemi, T.O | LUH 3457 |
| <i>Radlkofera</i> sp. i | Aponmu forest reserve, | Adeyemi, T.O and Ogundipe, O.T | LUH 3458 |
| <i>Radlkofera</i> sp. ii | Owena forest reserve, | Adeyemi, T.O and Ogundipe, O.T | LUH 3459 |
| <i>Radlkofera</i> sp. iii | Beau Mountains | Adeyemi, T.O | LUH 3460 |
| <i>Sapindus saponaria</i> L. | Limbe Botanic Gardens | Adeyemi, T.O | LUH 3461 |
| <i>Zanha golugensis</i> Hiern. | Forestry Research Institute of Nigeria, Ibadan | Adeyemi, T.O and Ogundipe, O.T | LUH 3462 |

Table 3. Samples collected from the herbarium and their locations.

| Species | Location | Collector(s) | Date | Voucher ID |
|--|-----------------------|----------------------------------|-----------|------------|
| <i>Allophylus abyssinicus</i> (Hochst.) Radlk. | Trinderet forest | | 16-Jan-64 | FHI 20336 |
| <i>Allophylus cobbe</i> (L.) Raeusch. | Buea Mountain | Bos, J.J | 19-Dec-69 | FHI 103688 |
| <i>Allophylus conraui</i> Gilg ex Radlk. | Mambilla Plateau | Chapman, | 12-Feb-72 | FHI 78107 |
| <i>Allophylus didymanaeus</i> | | | | FHI 75205 |
| <i>Allophylus grandifolius</i> (Bak.) Radlk. | Muyuka | Letouzey, R. | 26-Aug-83 | HNC 50596 |
| <i>Allophylus macrobotrys</i> Gilg. | Limbe Botanic Gardens | Reekmans, | 04-Jan-79 | FHI 95067 |
| <i>Allophylus megaphyllus</i> Hutch. and Dalz. | Ndian | Thomas, D.W. | 24-Nov-86 | HNC 64379 |
| <i>Allophylus nigericus</i> Bak. | Calabar | Olorunfemi, J | 27-Jun-79 | FHI 92242 |
| <i>Allophylus rubifolius</i> Engl. Abh. Preuss. | Ndian falls | Reekmans, | 24-Nov-86 | FHI 98646 |
| <i>Allophylus talbotii</i> Bak. | Yaoundé | Letouzey, R | 25-Jul-60 | SFRK 28391 |
| <i>Allophylus zenkeri</i> Gilg. ex Radlk. | Batouri | Letouzey, R | 14-Apr-62 | SFRK 6261 |
| <i>Aporrhiza nitida</i> Gilg. | Sakponba | Emwiogbon | 21-Jan-79 | FHI 63061 |
| <i>Aporrhiza talbotii</i> Bak. | Cross river | Amshoff, G | 11-May-78 | FHI 87370 |
| <i>Aporrhiza urophylla</i> Gilg. | | Alexandria, C.P. | 29-Dec-65 | FHI 6969 |
| <i>Cardiospermum corindium</i> L. | | Daramola, B.O | | FHI |
| <i>Cardiospermum halicacabum</i> L. | Dumbi community | Ohaeri, A.O. 947 | 29-May-75 | ABU 947 |
| <i>Chytranthus angustifolius</i> Exell. | Makoku | Gentry, A.L | 20-Jul-81 | FHI 102936 |
| <i>Chytranthus atrovioleaceus</i> Bak. ex Hutch. and Dalz. | Kade | Hall, J.B | 28-Mar-72 | GCH 43435 |
| <i>Chytranthus carneus</i> Radlk. | Bia National park | Abbiw and Hall, J.B. | 26-Sep-76 | GCH 4650 |
| <i>Chytranthus cauliflorus</i> (Hutch. and Dalz.) Wickens. | | Abbiw and Hall, J.B. | 05-Jan-74 | GCH 44715 |
| <i>Chytranthus gilleti</i> De Wild. | Mbalam | Mbamba, Ekitike | 23-Aug-82 | HNC 48253 |
| <i>Deinbollia angustifolius</i> D.W. Thomas | Makoku | Gentry A.L | 20-Jul-81 | FHI 84378 |
| <i>Deinbollia grandifolia</i> Hook. f. | Bakwai | Hall, J.B. | 09-Jun-79 | GCH 47068 |
| <i>Deinbollia insignis</i> Hook. f. | Obudu | Ariwaodo, J.O and Odewo, T.K. | 18-Mar-86 | FHI 102216 |
| <i>Deinbollia kilimandscharia</i> Taub. | | De WILDE, J.J and De WILDE, B.E. | 17-Aug-65 | GCH 7781 |
| <i>Deinbollia maxima</i> Gilg. | Bakossi mountain | Thomas, D.W and Mcleod, H.L. | 03-Jan-86 | HNC 56603 |
| <i>Deinbollia mezillii</i> Thomas and Harris | Kribi | De WILDE, J.J | 24-Jun-75 | GCH 44613 |
| <i>Deinbollia pinnata</i> Schum. and Thonn. | Ondo | Odewo, T.K. | 17-Apr-89 | FHI 103697 |
| <i>Deinbollia pycnophylla</i> Gilg ex Radlk. | Batouri | Letouzey, R. | 30-Apr-62 | GCH 6226 |
| <i>Deinbollia molluscula</i> Radlk. | Bonsa | Abbiw and Hall | 05-Nov-73 | GCH 45939 |
| <i>Deinbollia pynaerti</i> De Wild. | Batouri | Letouzey, R. | 30-Apr-62 | GCH |
| <i>Deinbollia voltensis</i> Hutch. | Kpondai | Hall, J.B. | 15-Jul-70 | GCH 40483 |
| <i>Dodonaea viscosa</i> (L.) Jacq. | ABU, Zaria | Adeyemi, T.O | 02-Jun-09 | LUH |
| <i>Eriocoelum kertstingii</i> Gilg. ex Engler. | Mambilla Plateau | Ibhanesebhor | 13-Nov-75 | FHI 177683 |
| <i>Eriocoelum microspermum</i> Radlk. ex De Wild. | Limbe Botanic Gardens | | | FHI |
| <i>Eriocoelum oblongum</i> Keay | Calabar | Onyechuson | 28-Mar-64 | FHI 154222 |

Table 3. Contd.

| Species | Location | Collector(s) | Date | Voucher ID |
|---|-----------------------|------------------------|-----------|------------|
| <i>Eriocoelum pungens</i> Radlk. ex Engl. | Abidjan | De WILDE, J.J | 29-Sep-63 | GCH 53159 |
| <i>Eriocoelum racemosum</i> Bak. | Benso | Enti, A.A | Sep-59 | GCH 7306 |
| <i>Ganophyllum giganteum</i> (Chev.) Hauman. | Youkadouma | Letouzey, R | 2-Jul-63 | HNC 7361 |
| <i>Haplocoelum gallaense</i> (Engler) Radlk. | | Letouzey, R | 20-Jul-86 | HNC 59423 |
| <i>Harpullia zanguebarica</i> (Oliv.) Radlk. | Victoria | | | FHI 9291 |
| <i>Laccodiscus pseudostipularis</i> Radlk. | Mamfe | Floreay, J.J. | Nov-72 | FHI 39252 |
| <i>Lecaniodiscus punctatus</i> J.B. Hall | Kibi-Akwadum | Hall, J.B. | 25-Nov-77 | GCH 46960 |
| <i>Lepisanthes senegalensis</i> (Juss. ex Poir.) Leenh. | Imo | Ohaeri, A.O. | 13-Sep-88 | ABU 2619 |
| <i>Lychnodiscus brevibracteatus</i> R. Fouilloy | Yaoundé | Letouzey, R | 6-Jul-72 | SFRK 28388 |
| <i>Lychnodiscus danaensis</i> Aubreville and Pellegrin. | Asukese | Enti, A.A | 02-Mar-73 | FHI 79666 |
| <i>Lychnodiscus grandifolius</i> Radlk. | Kribi | Bos, J.J | 15-Dec-69 | HNC 31755 |
| <i>Lychnodiscus reticulatus</i> Radlk. | Obubra | Ariwaodo, J.O | 18-May-77 | FHI 88761 |
| <i>Melicoccus bijugatus</i> Jacq. | Victoria | Ogu | 13-Apr-60 | FHI 52431 |
| <i>Nephelium lappaceum</i> L. | Kade | Hall, J.B | 14-Jul-76 | GCH 46110 |
| <i>Pancovia bijuga</i> Wild. | Lagos | Jullick, R | 06-May77 | FHI 56562 |
| <i>Pancovia harmsiana</i> Gilg. | Bertoua | Letouzey, R | 20-Jan-60 | SFRK 2926 |
| <i>Pancovia laurentii</i> (De Wild.) Gilg ex De Wild. | Mesamena | Letouzey, R | 21-Feb-62 | SFRK 6223 |
| <i>Pancovia sessiliflora</i> Hutch. and Dalz. | Cross river | Letouzey, R | 16-Oct-73 | SFRK 72404 |
| <i>Pancovia turbinata</i> Radlk. | Marone | Abbiw and Hall, J.B. | 12-Aug-75 | GCH 45363 |
| <i>Placodiscus attenuates</i> J.B. Hall | Kissi | Hall, J.B | 2-Mar-75 | GCH 47087 |
| <i>Placodiscus bacoensis</i> Aubrév. and Pellegr. | Yakossi | Hall, J.B and Abbiw | 6-Apr-76 | GCH 3193 |
| <i>Placodiscus boya</i> Aubrév. and Pellegr. | Yokadouma | Letouzey, R | 08-Feb-71 | SFRK 23551 |
| <i>Placodiscus bracteosus</i> J.B. Hall | Ashanti | Vigne, G | Jan-30 | GCH 2694 |
| <i>Placodiscus cuneatus</i> Radlk. ex Engl. | Yaoundé | - | 21-Nov-63 | HNC |
| <i>Placodiscus glandulosus</i> Radlk. | Ndikinimiki | Letouzey, R | 8-Jan-72 | SFRK 28397 |
| <i>Placodiscus letestui</i> | Cross river | Latilo, A and Oguntayo | 28-Feb-73 | FHI 67759 |
| <i>Placodiscus oblongifolius</i> J.B. Hall | Beberi | Leewenberg, A.J. | 23-Feb-59 | GCH 2796 |
| <i>Placodiscus pseudostipularis</i> Radlk. | Beberi | Hall, J.B and Abbiw | 20-Aug-75 | GCH 45568 |
| <i>Placodiscus pynaertii</i> De Willd. | Congo | Abbiw and Hall, J.B. | 14-Sep-46 | FHI 15475 |
| <i>Placodiscus riparius</i> Keay | Njala | Deighton, J.C. | 17-Sep-51 | FHI 39473 |
| <i>Placodiscus turbinatus</i> Radlk. | Korup | Odewo, T.K | 3-Apr-88 | FHI 10543 |
| <i>Sapindus trifoliatus</i> L. | Abeokuta | Daramola, B.O. | 31-Aug-68 | FHI 61564 |
| <i>Schleichera trijuga</i> Willd. | Limbe Botanic Gardens | De WILDE, J.J | 14-Mar-34 | FHI 12061 |

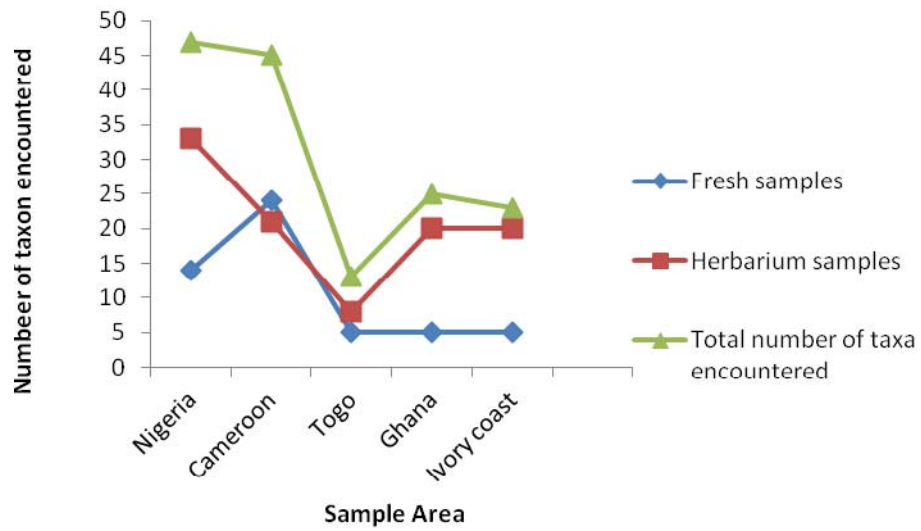


Figure 1. Number of taxa encountered per country visited.

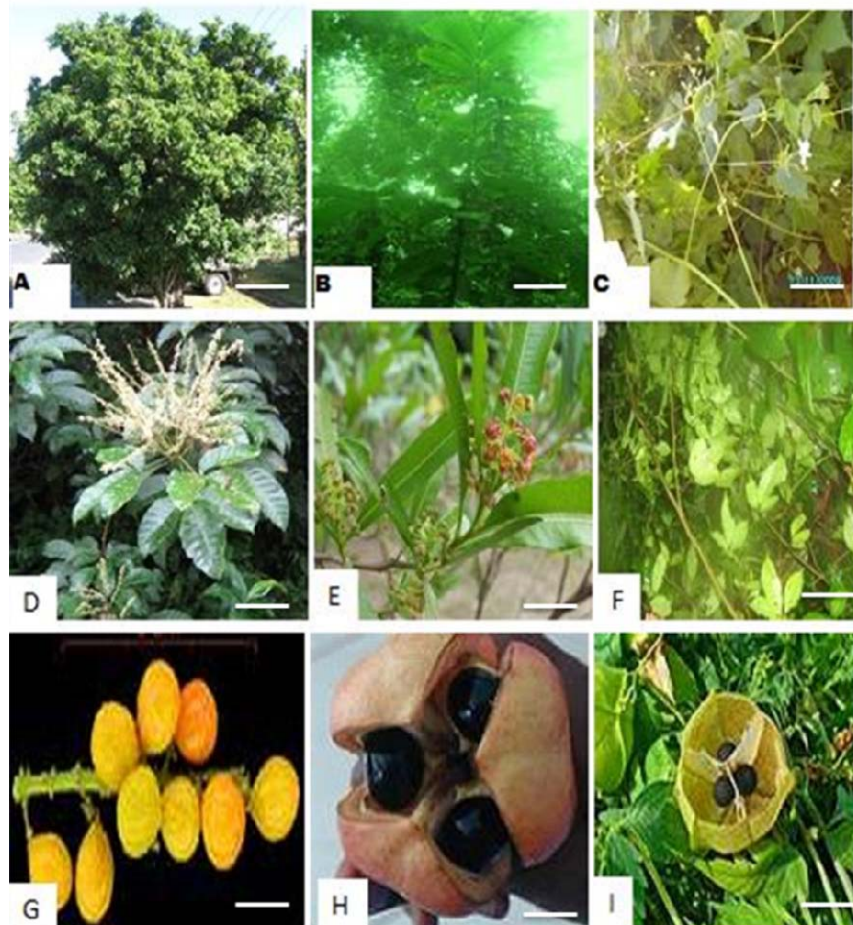


Plate 1. Diversity of life forms within the family Sapindaceae in West Africa. (A.) Tree Species; (B.) Shrub (C.) Climbing Form (D.) Compound leaves with inflorescence in *Allophylus* (E.) Simple leaves of *Dodonea viscosa* (F.) Trifoliolate leaves of *Allophylus* (G.) Drupe in clusters (H.) Trilobed dehiscent capsule of *Blighia* (I.) Trilobed inflated fruit of *Cardiospermum*. Scale: 20 mm.

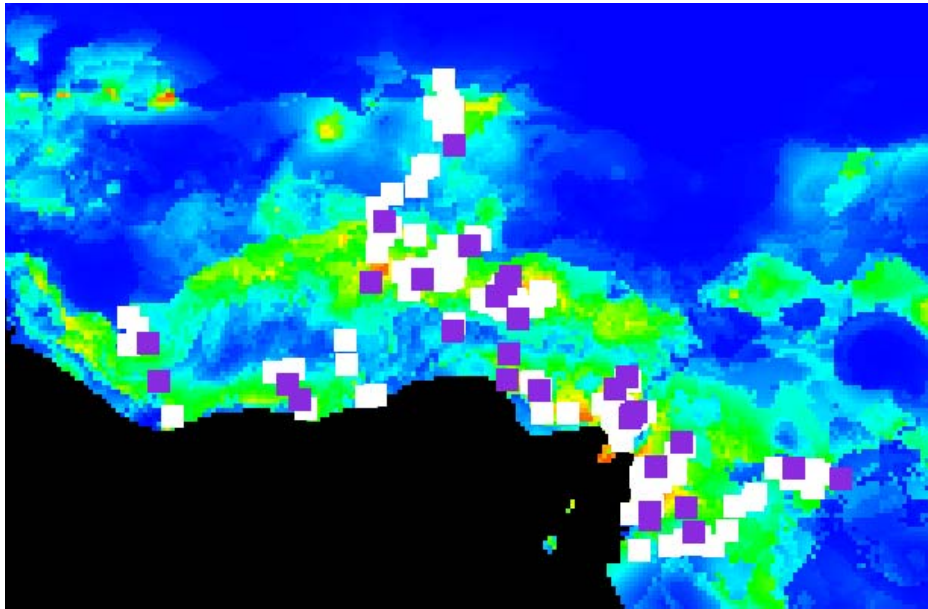


Figure 2. Distribution of sapindaceae in West Africa and western Cameroon: White dots show the locations.

Table 4. Percentage number of species encountered according to genera.

| Genera | Number of species encountered | Percentage number of species |
|----------------------|-------------------------------|------------------------------|
| <i>Allophylus</i> | 16 | 15.1% |
| <i>Aporrhiza</i> | 3 | 2.8% |
| <i>Blighia</i> | 3 | 2.8% |
| <i>Cardiospermum</i> | 3 | 2.8% |
| <i>Chytranthus</i> | 10 | 9.4% |
| <i>Deinbollia</i> | 12 | 11.3% |
| <i>Dodonaea</i> | 1 | 0.9% |
| <i>Eriocoelum</i> | 6 | 5.7% |
| <i>Ganophyllum</i> | 1 | 0.9% |
| <i>Glennia</i> | 1 | 0.9% |
| <i>Haplocoelum</i> | 1 | 0.9% |
| <i>Harpulia</i> | 1 | 0.9% |
| <i>Laccodiscus</i> | 2 | 1.9% |
| <i>Lecanodiscus</i> | 2 | 1.9% |
| <i>Lepisanthes</i> | 1 | 0.9% |
| <i>Lychnodiscus</i> | 4 | 3.8% |
| <i>Majidea</i> | 1 | 0.9% |
| <i>Melicoccus</i> | 1 | 0.9% |
| <i>Nephelium</i> | 1 | 0.9% |
| <i>Pancovia</i> | 10 | 9.4% |
| <i>Paullinia</i> | 1 | 0.9% |
| <i>Placodiscus</i> | 15 | 14.2% |
| <i>Radlkofera</i> | 4 | 3.8% |
| <i>Sapindus</i> | 2 | 1.9% |
| <i>Schleichera</i> | 1 | 0.9% |
| <i>Zanha</i> | 1 | 0.9% |
| Total | 104 | 100 |

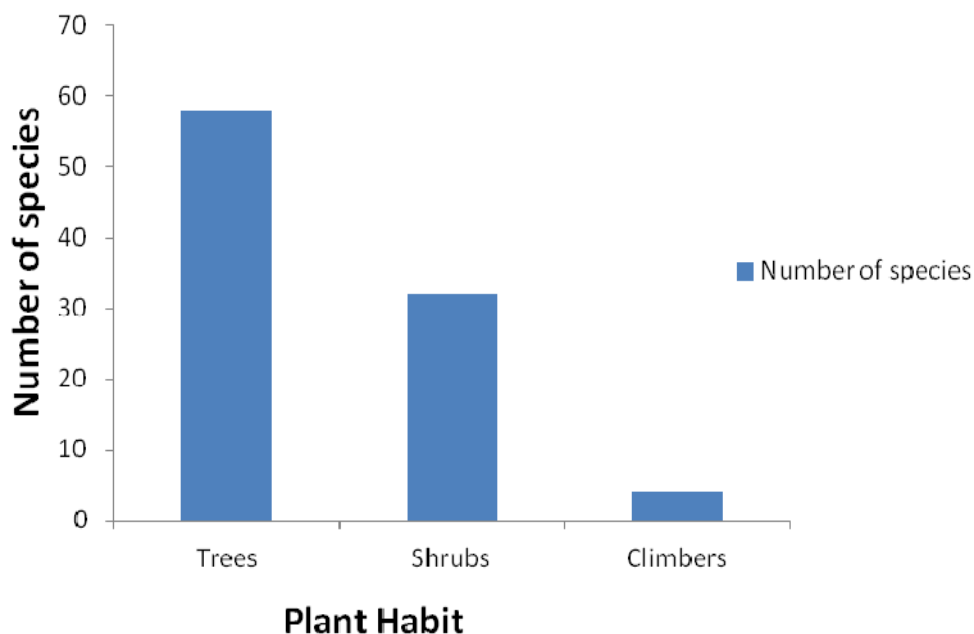


Figure 3. Number of life forms of family Sapindaceae represented in West Africa.

conservation. This is confirmed in this study as it was observed that some of the species earlier recorded in some of the reserves were no longer found largely due to the high rate of deforestation and agricultural activities going on in the reserves.

This study provides a virtual guide to field identification of members of the family Sapindaceae in West Africa and can be seen as a step in solving taxonomic identification problems and biodiversity conservation as a whole. It is therefore expected that this report will assist scientists in the area for on-the spot identification of plants in the field.

Conflict of Interests

The author(s) have not declared any conflict of interests.

ACKNOWLEDGEMENTS

The authors would like to thank the Explorers Club USA (www.explorers.org) for their financial support. Also special thanks go to Dr Jean M. Onana (Herbier National du Cameroun, Yaounde), Dr I. K. Asante (Department of Botany, University of Ghana, Legon), Mr. Gilbert Kimeng and Mr. Kossi Adjonou for their technical support.

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APPENDIX



Allophylus africanus showing flower



Allophylus spicatus



Allophylus sp.



Allophylus sp.



Alphitoea sp.



Alphitoea sp.



Cardiospermum grandiflorum



Cardiospermum halicacabum



Chytranthus macrobotrys



Chytranthus setosus



Chytranthus sp ii



Chytranthus talbotii



Dodonea viscosa



Eriocoelum macrocarpum



Laccodiscus ferrugineus



Leucantheus uspanitika



Melissa frutescens



Placodiscus sp (i)



Placodiscus sp (ii)



Radlkofera calodendron



Radlkofera sp (i)



Sapindus saponaria showing fruit



Zanha aoluensis