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Diversity and local use of ornamental horticultural flora in the *Bangui and* Begoua communes/districts, Central African Republic

Kosh-Komba E.[1,2]*, Semboli O.[1], Touckia G. I.[4], Oualengbe K. L., Mololi A.[2] and Akpagana K.[3]

[1]Plant and Fungal Biodiversity Laboratory, Faculty of Sciences, University of Bangui, Central African Republic.
[2]Laboratory of Biological and Agronomical Sciences for Development, Faculty of Sciences, University of Bangui, Central African Republic.
[3]Laboratory of Botanical and Ecological Plant, Faculty of Sciences, University of Lome, Togo.
[4]High Institute of Rural Development, University of Bangui, Central African Republic.

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Ornamental plants are still one of the components of plant biodiversity, due to their beautiful flowers or folia, fruits and, shape that are of aesthetic, economic and cultural interest for people. The purpose of this study is to make an inventory of ornamental plants and their local uses in the municipalities of Bangui and Bégoua areas that can be used to establish a database of horticultural flora of Central African Republic. Ethnobotanical surveys have made it possible to collect information on the scale of households and furnished areas. This inventory shows an important diversity. Thus, 196 species targeted as ornamental plants divided into 122 genera and 65 families have been reported. The Fabaceae family (9 genera and 14 species) is the most represented, followed by the Euphorbiaceae (8 genera and 11 species), Araceae (7 genera and 9 species); Liliaceae (7 genera and 8 species) and, Malvaceae (6 genera and 8 species). Herbs are the most represented morphological types (39, 80%) followed by shrubs and, trees (21, 94%), and lianas (14, 58%). Out of all the uses reported, food plants were the most represented (65) followed by medicinal plants (55). The decoction (52%) and the infusion (20%) are respectively the methods of preparation of the most cited recipes followed by crushing (13%). The leaves (38%) and flowers (10%) are the most used organs. Reproduction by seeds is the most widely used method of propagation (53, 27%) followed by cuttings (30, 65%).

Key words: Ornamental plants, diversity, local uses, Central African Republic.

INTRODUCTION

The biological diversity plays an important role in the Spiritual and cultural life of many human societies Animal and microbial species are responsible for soil composition, maintaining their quality, detoxication and wastes' decomposition. An appropriate vegetal covering can impeach floods, landslides and avalanches, limiting

*Corresponding author. E-mail: koshkomba2002@yahoo.fr.

soil erosion and contribute to the quality of air and water and that of climate stabilization. Maintaining species' diversity enables the natural parasites control, pollution, cultures production and flood security. This biological diversity is the sine qua non condition for the recovery of the ecosystem and forms of life and their capacity to prevent and defend themselves against catastrophe and unfavorable conditions (Boisson de Chazournes, 2009). Being part of that biological diversity, ornamental plants present an aesthetical interest due to the fact of the beauty of their flowers, or foliage, or fruits or stems. Like cultivated plants, they are always the result of an intensive selection. For the conception and keeping parks, green spaces and gardens, landscapers and amateur gardeners use specific plants.

Worried about conserving and ameliorating the quality of savage vegetables and increasing their yield, man has thus earlier tempted to tame them on more or less vast spaces. With this fact, this approach contributes to managing the biological diversity in general and horticultural in particular (Mboh, 2001; WWF and UICN, 1994). But beyond this useful notion, many people like plants only for their beauty (Barloy, 1984), either for their foliage beauty, stems, flowers or fruits beauty. Nevertheless, the expansion of horticulture increases in number of taxons and mobilizes an important phyto-diversity constituted either of local floras and species introduced a long time ago or very recently (UICN, 1994). Flowers, ornamental plants, perfume plants, aromatic medicinal herbs are chosen by the bulk of the population that appreciates the natural aspect in the products that they buy. It is the main source of income for many farmers and brings a complementary income to other people (Viguier, 2006).

The development of ornamental horticulture depends on the evolution of very high urban societies. Today, towns grow under a double demand: searching the quality of life to which the presence of vegetables contributes and the obligation to restrict agricultural soils consumption that implies the urban tissue densification (Colson et al., 2016).

Ornamental horticulture employs young people of different age groups and contributes to reduce the number of unemployment. Ornamental plants are appreciated for the perfume elated by their organs. They embellish life's environment; they are used for many demonstrations (births, birthdays, marriage, deaths and so on) and flower accompanies any moment of emotion (Aké, 2002). Nevertheless, for cases of death, one notices that artificial flowers are mostly used by people at the expense of natural flowers with environmental pollution as consequences.

This important sector does not have the organizational level nor the same professionalism as known in other countries in Africa such as Kenya (Jaffe and Masakure, 2005; Neven et al., 2009) or in other developing countries that exploit great important quantities of flowers in the world (Roy and Thorat, 2008). Nowadays in the Central African Republic, flower is no more a luxury but has become a whole part in internal decoration. Marriage, births, birthdays and funerals are opportunities to offer flowers. In fact, they are diversely used and for that reason, other flowers are those that were introduced and some others are local plants.

In the Central African Republic as in other countries in the world, ornamental plants hold an important place in the urban life and are not only used for ornamental use. Most healers do not have gardens in which these plants are used. When it is necessary, they collect them in the bush or in the forest. It is the same thing for all common plants used. This attitude vis-à-vis harvest has negative consequences on the economy because the culture and selling these products would yield incomes to the population together with furnishing vegetables all year long. This results in the reduction of scarce periods and hunger in the country (Koyt-Deballé and Kosh-Komba, 2015). They are found on lay out spots in public and private institutions in the capital city. Today, it is important to capitalize empiric knowledge of these phytogenitic resources instead of being restricted to the only ornamental uses. This approach will contribute to managing the biological diversity in general and horticultural one in particular. The present tendency is thus to regularize natural flowers. This gives birth in that moment to the questions of researches to know the plants best on the botanic plan in order to make a good use without any danger either on the natural or human environment.

The present study targets at listing ornamental plants and their local uses in Bangui and Begoua communes, so as to establish a database of the Central African Republic's horticultural flora. It concerns mainly: listing cultivated or used plants as ornaments in Bangui and Begoua communes for identification; evaluating their local uses and other ornamental aspects.

MATERIALS AND METHODS

Study area

Bangui and Begoua communes (Figure 1) have been chosen as the study sites because they constitute a high built-up area and harbor very important administrative representations that highly use phytogenitic resources of ornaments. It is also the main area of horticultural practice where the products are used during various ceremonies such as birth, birthday, marriage, funerals, amongst other.

The climate of the communes of Bangui and Bégoua is of the Guinean forest type with alternate two seasons: a rainy season which goes from March to mid-December and a dry season, from January to February. The annual mean maximum temperature is 32.4°C. The differences between the minimum and the average maximum are moderate (11.2° C).

Humidity in Bangui is always above 50%, except in the middle of the day in January and February. The prevailing wind is the monsoon coming from the southwest, that is, coming from the Saint Helena high (Hot and Humid), which is often the cause of heavy rains. Sometimes the harmattan which is a dry wind blows from the

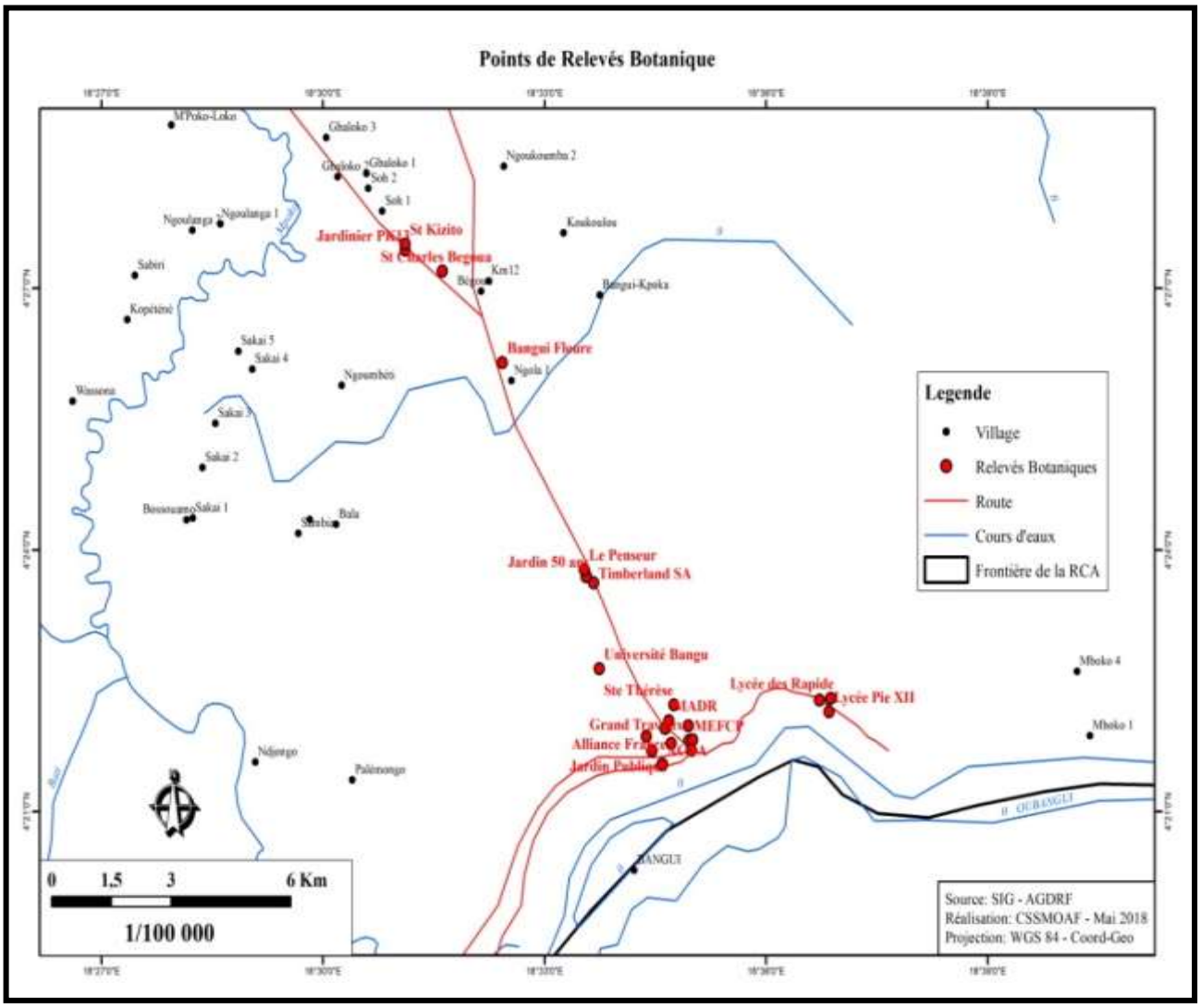

Figure 1. Localizations of botanic data collection.
Source: SIG-AGDRF (2018).

northeast (Libyan high pressure), thus causing the dry season. To this end, the average annual rainfall in Bangui and Bégoua is in the order of 1500 mm / year.

Materials of study

Ornamental plants cultivated in Bangui and Begoua communes constitute the vegetal material on which stands the present study. They consist of small shrubs, forest shrubs, sub forest shrubs, trees, herbs, climbing plants or creepers, delicious or fat plants and palm-trees.

Ethnobotanic data

In each farm, each converted farming garden was considered as a botanic statement/argument. Ethnobotanic data were collected according to Radji's pattern (2010).
Inquiries are done in two steps:

- the first step entailed going from public and private institutions to institutions of the town;
- the second step concerned households having converted farms.

The information obtained was on plants as ornaments, their local use, organs, usage and receipts' administration and their method of reproduction. Fence plants, path plants, or avenue plants, those found in internal and external gardens, flat plants and at cut flowers, lawn plants or cover-soil, ornamental water plants were identified.

Different parks, gardens and nurseries were identified and listed. Data collected on ornamental vegetal material are mainly based on observation, quantitative sampling in Bangui and Begoua communes. Each farmer or owner was informed about the object of the study and their agreement was acquired through an oral or written authorization.

A pre-established discussion guide on the basis of a quantitative method intended to collect ethnobotanic information was administrated to the farmers, employees and other targeted human resources concerned by the inquiry.

Questions were given in the two official languages: French and sängö (the national language of the country). Horticultural farmers

were identified and censed.

Floristical richness

The floristical richness of the area of study is expressed in terms of number of species, genders and families.

Identification

The botanical determination was made *in situ* and by the concomitant use of the botanical literature (Aumeeruddy et al., 1989; Kroll, 1992; Maydell, 1990; CTA, 1992; Saulnier, 1995; atlas of the decorative plants of Ziban (Maaoui, 2014), abbreviated botanical (Guignar, 1983), shortened botany Medicinal encyclopedia (Chevallie 2001; Chevallier, 1986), Medicinal Encyclopedia of Africa (Larousse Africa, 1986) handbook of forest botany (Letouzey, 1982), memorandum of the agronomist (MCD 1991); memento of the tropical forester (CTFT., 1989) and the Web site to lead to a reliable identification. It was accompanied by the list of the families drawn from the system from classification of APG III, (2009) and the basic list of the species and their groups of use (http://www.prota.org/fr). The Web site (https://eol.org/pages/6935679/articles) made it possible amongst other things to specify the origins of the inventoried plants.

Data analysis

The data collected were typed in a Microsoft Excel 2010 chart as a matrix that was submitted to analyses to discriminate them. The Multiple Component Analysis (MCA) was done through XLSTAT-pro version 2013.5.01 software (https://www.xlstat.com/fr/articles/xlstat-2008).

RESULTS AND DISCUSSION

Socio-demographical characteristics of the subjects

Inquiry about ornamental plants' knowledge and traditional use concerned 50 people of which many are 16 adult gardeners (aged >35 years old). 56% of the subjects have a secondary/high school level. Subjects with primary school level represent 22%, 12% are illiterate and 10% are those with university degrees. Men constitute 54% against 46% women. The subjects' age varies between 15 to 70 years old with the majority aged between 50-55 years old (22%). Of the 16 gardeners, 56% are employees and 44% are independent workers.

Floristic diversity

The inquiry helped to cense 196 species divided into 65 families and 122 genders. The most represented botanic families are: *Fabaceae* (9 genders and 14 species), *Euphorbiaceae* (08 genders and 11 species), *Araceae* (7 genders and 9 species), *Liliaceae* (7 genders and 8 species), *Malvaceae* (6 genders and 8 species). The *Mangifera indica* specie is the majority, followed by the *Elaeis guinensis*, *Codiaceum variegatum*, *Paspalum distinchum* and *Ixora chinensis* (Table 1).

Herbs (78 species) constitute the most represented morphological type. Fort-five (45) species are small shrubs, forest shrubs and sub forest shrubs. Trees are represented by 43 species, lawns by 14 species, delicious plants by 11 species and palm trees by 5 species. Eleven 11 fat or delicious plants have been discovered. *Commelinaceae* family is the most represented (with 3 genders and 3 species), followed by *Liliaceae* (2 genders and 2 species), *Agavaceae* and *Cramulaceae* (1 gender and 2 species). *Cataceae* and *Euphorbiaceae* families are represented each by one gender and one species (Figure 2).

Horticultural species are found on the five continents: 36% of the listed ornamental plants are from America against 32% from Asia and 20% from Africa. Apart from America, Asia and Africa, European and Oceanic continents have respectively 07 and 05% species.

Plants' distribution according to decorative organs

The beauty of plants is due to its different organs. According to the seasons, different organs (leaves, flowers, fruits and stems) can also combine to give a most attractive decorative aspect. The 22 species' decorative organs (shared among 21 genders and 17 families) have not been determined (identified) (Table 2).

Plants' spatial situation on the sites

Avenues, roads and edge plants

In the series of edges, roads or avenues plants, trees and small shrubs through their foliages and forms have been identified according to seasons and non-flowerings. *Fabaceaes* are the most represented (02 genders and 03 species), followed by *Araliaceaes* and *Arecaceaes* (02 genders and 02 species), *Myrtaceaes* (01 gender and 02 species). Among many others, one can find: *Acacta auriculiformis*, *Acacia mangium* and *Delinix regia* (Fabaceae), *Aralia elata* and *Aralia hispida* (Araliaceae), *Cocos nucifera* and *Eleasis guinensis* (Arecaceae), *Roysttonea regia* (Arecaceae), *Eucalyptus camaldulensis* and *Eucalyptus citrodora* (Myrtaceae), *Polyalthia longifolia* (Annonaceae) and *Mangifera indica* (Anacardiaceae).

Isolated plants in external gardens

These are trees, small shrubs, sub forest shrubs and herbs put into pots, and either exposed or not. Isolated plants, lawn plants, massive plants, ornamental vivid hurdles or protection plants, soil spread and decorative plants are identified.

In order to plant a specie in a garden, it must be

Table 1. Alphabetical index of ornamental plants found in Bangui and Begoua communes.

Plants' Families	Scientific names
Agavaceae	*Russelia esquisetiformis* Schlecht. & Cham.
	Sanchezia nobilis Hook.
	Agave americana L.
	Agave sisalana Perrine
	Yucca aloïfolia L.
Aïzoaceae	*Alpinia sanderae* Hort. Sand.
	Aptenia cordifolia (L. f.) Schwante, 1928
Amaranthaceae	*Alternathera bettzickiana* (Regel)
	Amaranthus hybridus L.subsp
	Amaranthus tricolor L.
	Celosia argentina L.
	Celosia trigyna L.
Amarylidaceae	*Crinum latifilium* L., 1753
	Hippeastrum puniceum William Curtis (1746-1799)
Anacardiaceae	*Mangifera indica* L.
	Spondias cytherea SONN.
	Trichoscypha ferruginea Engl. (1892).
	Anacardium occidentale L.
Annonaceae	*Annona muricata* L.
	Annona squamosa L.
	Cananga odorata (Lam.) Hook.f. & Thomso
	Polyalthia longifolia (Sonn.)
Apiaceae	*Apium graveolens* L.
	Centella asiatica L.
	Daucus carota Lam.
	Petroselinum crispum (Mill.) Fuss
Apocynaceae	*Allamanda cathatica* L.
	Catharanthus roseus (L.). G. Don.
	Nerium oleander L.
	Plumeria alba L.,1753
	Plumeria rubra L.
	Thevetia peruviana (Pers.) Merr.
Araceae	*Alocasia korthalsii* Schott
	Alocasia lowii Hook.
	Dieffenbachia amoena Hort. Ex Gentil
	Dieffenbachia maculata Schortt. Var. RR
	Dieffenbachia piacta Schortt
	Caladium bicolor (Aiton)Ven.1801
	Philodendron sp
	Epipremnum aureum (Lindi et André) G.S. Bunting, 1963 (1964)
	Spathiphyllum sp
	Xanthosoma sagittifolium (L) Schott
Arecaceae	*Cocos nucifera* L.
	Corypha umbraculifera L.
	Elaeis guineensis Jacq.
	Roystonea regia (Kunth) O.F. Cook.
Araliaceae	*Aralia elata* Seem. Variegata
	Aralia hispida Burm.f.
	Polyscias guilfoylei L.H. Bailey
Aristoclaceae	*Aristolochia brasiliensis* Mart et Zucc.

Table 1. Cont'd

Asteraceae	*Lactuca sativa* L., 1753
	Helianthus annus L.
	Tagetes erecta L.1753
	Tithonia diversifolia (Hemsl.) A. Gray.1883
	Wedelia trilobata (L.) Hitch.
	Zinnia elagans Jacq. Syn. Z viplaceae Cav
Balsaminaceae	*Impatiens balsamina* (L.)
	Impatiens marianae Rchb.f.ex Hook.f.
Basellaceae	*Basella alba* L., 1753
Begoniaceae	*Begonia rex* Putz., 1856
	Crescentia alata Kunth.
Bignoniaceae	*Tabebuia avellanedae* Lorentz ex Griseb.
Brassicaceae	*Brassica oleracea capitata* var.
	Brassica oleracea subsp.
Bromoliaceae	*Ananas comosus* (L.) Merr.
Burseraceae	*Dacryodes edulis* (G.Don) H.J. Lam
Cactaceae	*Cactus* sp
	Opuntia ficus-indica (L.) Mill.1768
Caricaceae	*Carica papaya* (L.)
Cannaceae	*Cannan indica* (L.) 1753
Celastraceae	*Eunymus japonicus* L.f., 1780
Combretaceae	*Quisqualis indica* L.
	Terminalia mantaly H. Perrier
Commelinaceae	*Tradescentia spathacea* Sw.,1788
	Tradescantia fluminesis Vell. Variegata
	Zebrina pendula Schnizl.
Convolvulaceae	*Ipomea batatas* L. Lam
	Ipomea indica (Burm. F.) Merr.
	Merremia dissecta (Jacq.) Hallier f.
Crassulaceae	*Kalanchoe dilagoensis* Eckl & Zeyh.
	Kalanchoe pinata (Lam.) Pers.
Cucurbutaceae	*Cucurbita maxima* Duchesne
	Cucumis melo L
Cupressaceae	*Thuja occidentalis* L. 1753
Cyperaceae	*Cyperus alternifolius* L.
Dracaenaceae	*Draceana* sp.
Gesneriaceae	*Episcia cupreata* (Hook.) Hanst.
Lamiaceae	*Coleus rheltiannus* A.
	Gmelina arborea Roxb.
	Ocimum basilicum L.
Lauraceae	*Tectona grandis* L.f.
	Laurus nobilis L. 1753
	Persia americana Mill.
Liliaceae	*Chlorophytum comosum* (Thunb Jacques[(1)]
	Allium cepa L.
	Allium schoenoprasum L.
	Aloe vera (L.) Burm. f. 1768
	Cordyline terminalis (L.)
	Covallaria majalis L.
	Sansevieria trifasciata Prain, 1903
Euphorbiaceae	*Acalypha hispida* Burm f
	Acalypha wilkisiana Mül

Table 1. Cont'd

	Breynia nivosa Small.
	Codiaeum variegatum (L.) A. Juss
	Euphorbia lacta Haw.
	Euphorbia milii Des Moul.
	Hura crepitans L.
	Jatropha curcas L.
	Manihot esculenta Crantz.
	Manihot glaziovii Muell. Arg.
	Ricinus commusis L. 1753
	Acacia auriculiformis A. Cunn. ex. Benth
	Acacia mangium Wild.
	Albizia lebbeck (L.) Benth
	Albizia julibrissin Durazz, 1772
	Arachis hypogaea L.
	Caesalpinia pulcherrima (L.) Sw.
Fabaceae	*Cassia alata* (L.). Syn. *Sena alata*
	Cassia javanica L.
	Cassia siamea Lam.
	Cajanus cajan (L.) Millsp.
	Delonix regia (Boj. Ex. Hook.) Raf.
	Leucaena leucocephala (Lam.) de Wit.
	Phaseolus vulgaris L.
	Tamarindus indica L.
	Abelmoscus esculentus L.
	Cola nitida (Vent.) Schott et Endl.
	Corchorus olitorius L.
Malvaceae	*Gossypium barbadense* L.
	Hibiscus rosa-sinensis L.
	Hibiscus schizopetalus (Dyer) Hook.f.
	Hibiscus sabdiraffa L.
	Malvaviscus arborus Cav.
Marantaceae	*Hypselodelphis* sp.
Meliaceae	*Azadiracthta indica* A. Juss.
	Artocarpus nobilis J.L. et G. Forest.
Moraceae	*Artocarpus heterophyllus* Lam.
	Ficus pumila L.
	Heliconia illustris W.Bull.
Musaceae	*Heliconia rostrata* Rutz & Pavon
	Musa paradisiaca L[(1)]
	Musa sapientum L.
	Eucalyptus camaladulensis Dehnh.
Myrtaceae	*Eucalyptus citriodora* Hook.
	Psidium guajava L.
	Punica granatum L.
Moringaceae	*Moringa oleifera* Lam.
	Bougainvillea glabra Choisy
Nyctaginaceae	*Bougainvillea spectabilis* Willd
	Mirabils jalapa L.
	Jasminum sambac Soland
Oleaceae	*Jasminum polyanthum* Franch.
	Olea europaea L.
	Syringa microphylla 'Superba'

Table 1. Cont'd

Oxalidaceae	*Averrhoa carambola* L.
Papaveraceae	*Arguemone mexicana* L.
Passifloraceae	*Passiflora incarnata* L., 1753
Pedaliaceae	*Sesamum indicum* L.
	Bamboussa vulgarissa Schrader exWendl.
	Cymbopogon citratus (DC.) Staapf,[(1)]1906
Poaceae	*Paspaluim distinchum* (L.)
	Saccharum officianum L.
	Zea mays L.
Portulacaceae	*Portulaca grandifolia* (Hook.)
Pteridaceae	*Adiantum capillus*-veneris
	Coccinia sp.
	Coffea Arabica L.
	Coffea canaphora Pierre
Rubiaceae	*Gardenia jasminoides fortuniana*
	Gerbera jamesonii Bolus ex Hooker f.
	Ixora chinensis (DC.)
	Ixora coccinea L.
	Citrus limon (L.) Burm.f.
Rutaceae	*Citrus sinensis* (L.) Osbeck
	Citrus paradisi Macfad.
	Citrus reticulata Blanco
Rosaceae	*Rosa* sp.
Sapotaceae	*Vitellaria paradoxa* C.F.Gaertn
	Capsicum annuum L.
	Capsicum frutescens L.
	Nicotiana tabacum L.
Solannaceae	*Lycopersicum esculentum* L.
	Solanum melongena (L.)
	Solanum esculentum Mill.
	Solanum aethiopicum L.
Streliziaceae	*Strelitzia reginae* Aiton.
	Ravenala madagascariensis (Gmel.)
Turneraceae	*Turnera diffusa* Willd. Ex Schult.[(1)]
Verbenaceae	*Lantana camara* L.
	Stachytarpheta cynensis (L.C. Rich) Schau
Zamiaceae	*Dionn eduml* Lindl.[(1)]
Zingiberaceae	*Curcuma aromatica* Salisb.
	Zingiber offinale Roscoe

beautiful, either by its foliage (*Nerium oleander*) with generous flourishing; it must be good for flowered fences (*Opuntia ficus-indica*); even if it is thorny, it should be externally used or its flowers. Examples are *Hibiscus rosa-sinensis* (Malvaceae), *Mirabilis jalapa* "*belle de nuit*" or *Perou's wonder* (Nyctaginaceae), *Punica granatum* (Myrtaceae) and *Albiza julilarissin Durazz*, 1772 (Fabaceae).

Nine families divided into 11 genders and 15 species were identified and known as isolated plants of external garden (Figure 3). Among these taxons, Apocynaceae are the most various (03 genders and 03 species), followed by Rutaceae (01 gender and 04 species) and Agavaceae (02 gender and 02 species). Other families such as Annonaceae, Cupressaceae, Dracaenaceae, Punicaneae, Rosaceae and Zaniacaceae are the weakly represented (01 gender and 01specie).

Internal garden plants

Flats' plants

These are found inside houses and flats: balconies,

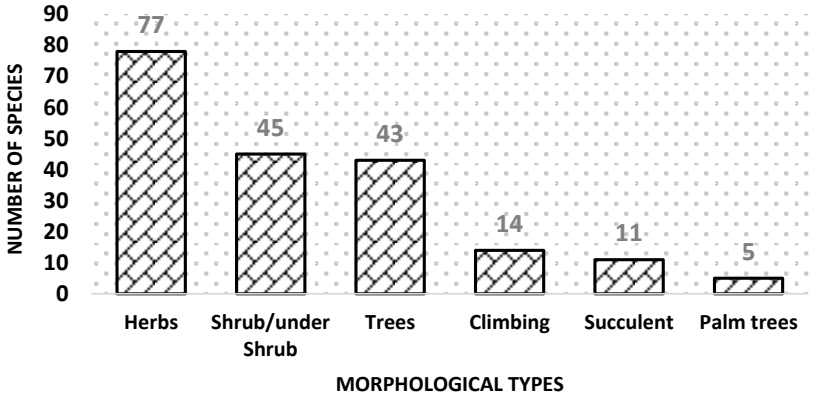

Figure 2. Number of species according to morphological types.

Table 2. Plants' distribution according to decorative organs.

Families number	Species number	Decorative organs
20	36	Foliage
40	86	Flowering
15	26	Look or decorative ports
14	16	Fruit
16	26	Stem

verandas, corridors or in offices. The following plants were identified as ornamental flats' plants: *Trudescantia flimensis* (Commeliaceae), *Sansevieriatrifasciata* (Liliaceae), *Begonia rex* (Begoniaceae), *Dieffenbachia maculatan*, *Dieffenbachia amoena* and *Dieffenbachia sp*. (Araceae).

Plants with flowers and foliage cut

Thirteen families composed of 13 genders and 15 species were censed and known as ornamental plants with flowers and foliages cut (Figure 3). Apocynaceae and Musaceae were the most represented (01 gender and 02 species) with *Plumeria rubra*, *Plumeria alba*; *Heliconia illustris* and *Heliconia rostra*. Other of such families as Aïzoaceae, Amarallidaceae, Amaranthaceae, Araceae, Cyperaceae, Euphorbiaceae, Fabaceae, Liliaceae and Streliziaceae are weakly represented by only one gender and one specie. Among these are: *Alpinia sancera*, *Hippeastrum puniceum*, *Amaranthus tricolor*: *Anthuriium scheerzerianu*, *Tithonia diversifolia*, *Cyperus alternifolius*; *Codiaeum variegatum*, *Caesalpinia pulcherinea*, *Sanseneria trifasciata*, *Ixora chinensis* and *Strelitzia reginar* or *paradise bird*.

Lawn plants or bedspread

In this category, Amaranthaceae (*Alternanthera bettaicheiana),* Aïzoaceae (*Aptenia cordifolia*) Poaceae (*Paspalum distichum*), Portugalacaceae (*Portucala grandifolia* or *Pourpier*) are cultivated in Bangui and Begoua communes as lawn plants or bedspread. Bedspread plants are the following: *Wedelia trilobata* (Asteracaceae) and as carpets on the wall; *Ficus pumila* (Moraceae).

Vivid hurdles and/or protection

Eight families gathered in 11 kinds and 14 species were listed and recognized like decorative plants of quickset hedges and/or protection; Rubiaceae and Verbenaceae are represented with 02 kinds and 02 species made up of Duranta repens, and Lantana will camara followed by Fabaceae, Nyctaginaceae and Malvaceae (01 kind and 02 species) represented by Cajanus cajan and *Caesalpinia pulcherima,* Apocynaceae and Myrtaceae (01 kind and 01 species) represented by *Thevetia peruviana* and *Punica granatum.*

Local use of plants

Ornamental plants also have other virtues (alimentary, medicinal, carpentry, etc). It was noticed that 14 alimentary products are obtained via ornamental plants with vegetables as the most represented (20.65%), oil (10%). Drinks, sauce parts and syrups represent 8.70% each. *Solanaceae* family is the most represented (8.96%)

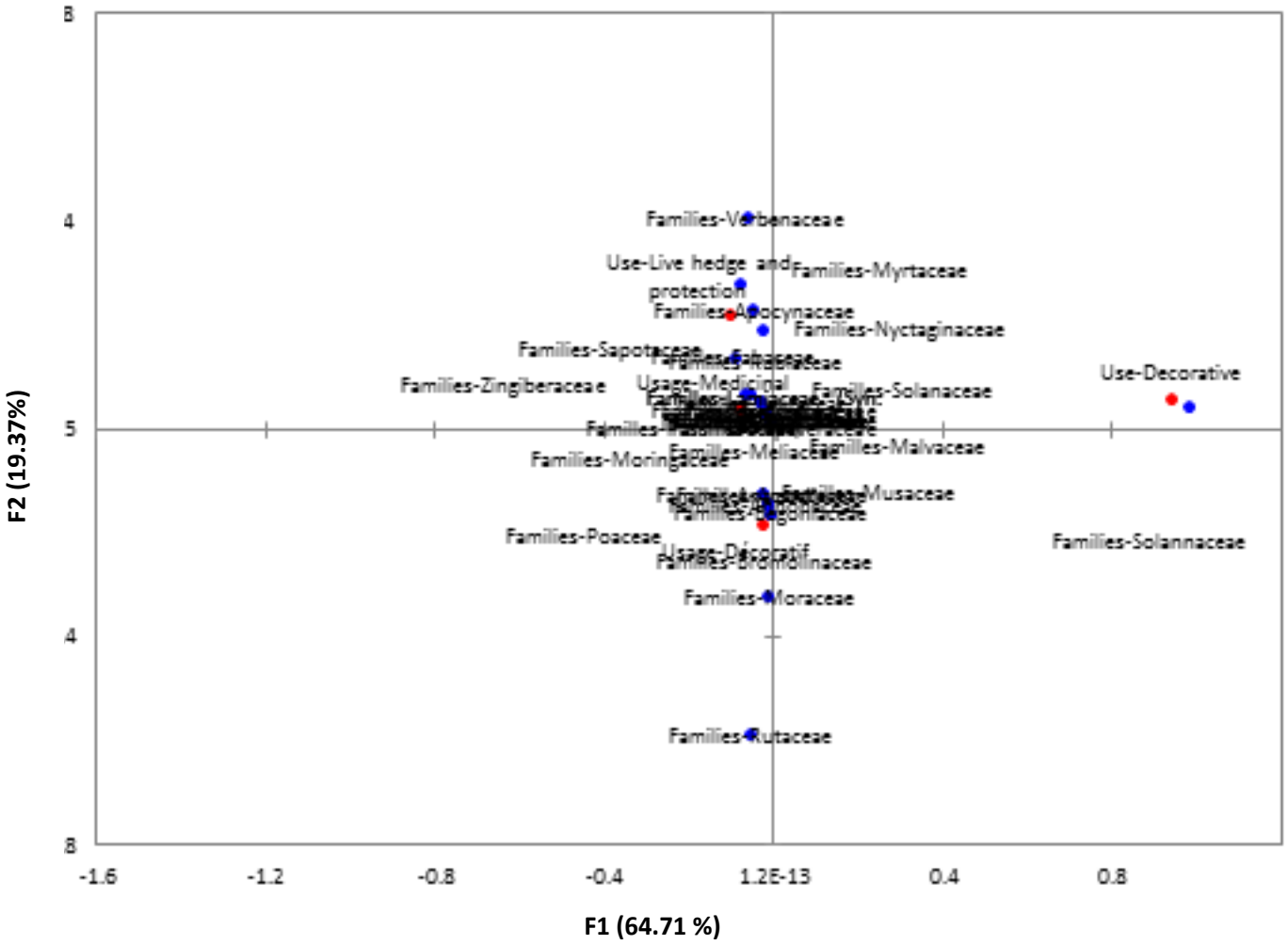

Figure 3. Ornamental plants uses' variability linked to the families.

followed by *Malvaceae* (7.46%) and *Fabaceae* (5.97%).

Fifty five species (divided into 51 kinds and 33 families) have medicinal use. Majority are fabaceae (5 kinds and 5 species) followed by Lamiaceae and Solanaceae (3 kinds and 3 species) and Euphorbiaceae (2 kinds and 3 species). The families of Anacardiaceae, Apiaceae and Liliaceae are slightly represented. 34.15 % of these decorative plants with medicinal virtue are used against pathologies of the circulatory apparatus (such as), 25.61% against those of digestive system, 18.29 % against pathologies concerning visual, urinary and nervous apparatus. 9.76 % are used against dermatomes and pathologies of genital apparatus. Decoction is the mode of preparation of the receipts more used (52 %) followed up by infusion (20 %), trituration (13 %) and maceration (9 %). Crushing and vegetal powder represents 3%. The path of the most used administration is the oral way (53 %) followed by brain/wash, cataplasm and friction (each one representing 14 %). Inhalation represents 5 %.

Six plants organs are used for traditional preparation. Leaves constitute the most used organ (38%) followed by roots (18%), barks (11%), flowers (10%), fruits (9%) and grains (7%). Saps and latex represent 4%. Other uses have also been signaled: ornamental plants are used as bio-pesticides (pet killers) (for example little hot pepper's fruits or *Capsicum frutescens* and Neem's leaves). Species such as *Acacia auriculiformis, Acacia mangium, Cassia siamea, Eucalyptus sp., Mangifera indica* that give the population building materials are used as firewood or for making coals.

Way of multiplying horticultural plants

For multiplication, sowings hold the great bulk (53.27%) followed by cuttings (30.65%). Bud, rafting and bulk divisions are the least used ways that are censed with

respectively 10.55, 3.52, 1.51 and 0.5%

Statistical analyses

The Multiple Component Analysis (MCA) reveals that axes F1 and F2 give 84.08% of information. This shows that there is no variability between using ornamental plants in link with the families. Thus, most of the families share the same uses except *Malvaceae*, *Moraceae* and *Solanaceae* that have distinct uses.

DISCUSSION

Bangui District constitutes an attractive centre at the socio-economic level and attracts a lot of people. The great towns are always different at the sociocultural level because of their socio-economic activities and public and private administrations. Of the twelve censed ethnic groups, the Gbayas followed by the Bandas are the most numerous (respectively with 44 and 30%). Komba (2013), in a study carried out on manioc, notices the same fact concerning these two ethnic groups. The same study carried out on the socioeconomic profile in Bangui in 2008 has shown that the Gbayas (52.8%) followed by the Bandas (22.9%) constitute the most represented ethnic groups. This is justified by the fact that in the Central African Republic, the Gbayas and the Bandas are the most represented and diversified ethnic groups. Horticulture is mostly practiced by adult people of more than 30 years old with the most predominance being 50-55 years old: aged people are most interested in ornamental plants and green spots. This demonstrates the interest shown in managing green spots. They are supposed to have the most liable information, due to the fact that they hold good ancestral knowledge which is a part of oral tradition. These variabilities are a consequence of milieu and sociocultural approach linked to customs. Lakouéténé et al. (2009), after realizing ethnobotanic inquiries on plants used in the treatment of malaria in Bangui, have shown that middle age people investigated was between the age gap of 40 to 44 years old, with a modal class of 50 to 55 years old. Meanwhile, Klotoe (2015), in an ethnobotanic study in Benin, obtained a majority age gaps of 20 to 40 years old followed by 40 to 60 years old.

Most of the investigated subjects are composed of more men (54%) than women (46%). Radji (2010), in a similar study, has confirmed the results obtained by showing that most of the Togolese horticulture explants are of male sex (56%), while majority are quadragenaries. Graigne et al. (2017), in an ethnobotanic study of medicinal plants in Ivory Coast, proved that among the 100 people having ethnobotanic knowledge that was investigated, men are the most represented (65%) against 35% of women. Bamidélé et al. (2014) questioned most men (78%) than women (28%) in a study done in Benin. In the Central African Republic in the customs, men who are the chiefs of the households represent the authority of the family and always have the right in talks. In Bangui and in Begoua, managing horticulture is thus majorly assumed individually because they represent the great majority of the samples during the inquiry. Quattara et al. (2016), in their works on the floristic diversity and uses of plants in the soudanese area in the North-west of Ivory Coast, have censed 426 species of plants, subdivided into 290 genders and 83 families. *Fabaceae* family (7.14%) is the most represented followed by that of *Euphorbiaceae* (5.61%), *Aracaeae* (4.6%). Diop et al. (2017), in a study on flora of the Michel Adanson botanic conservatory at Mbour in Senegal, have censed 140 species divided into 115 genders and 53 families of which *Fabaceaen Poacaceae* and *Malvaceae* are the most diversified with respective proportions of 19.40, 09.40 and 06.50%. Meanwhile, the number of families counted in Bangui and Begoua is higher than the results obtained by Radji (2010) in Togo and that obtained by Diop et al (2017) in Senegal and lower than that of Ouattara's et al. results in Ivory Coast with respective numbers of 66, 42 and 83. Results of studies about flora in general show that variabilities on the level of families, genders and species are linked to types of studies carried out together with geographic areas, characterized by climatic factors which are a determinant of vegetables repartition. The overabundance of water and high atmospheric moisture, including high luminosity, high temperature and good clearing give optimal climatic conditions for the abundance, maintaining and development of biological diversity. The most important morphologic types are herbs (39.80%), trees and little shrubs (21.94% each), creepers (14.58%). Radji (2010) has counted 55.33% of herbs followed by little shrubs (16%) and trees (15%). Herbaceae's proportion obtained in our study (39.80%) is lower than that obtained by Radji (2010) in Togo (53.23%). The great number of herbaceaes in the two studies is justified by their ways of use at different levels and by the fact that these species are used at different places, mainly in platforms as external garden plants or put into pots to decorate paths, corridors, balcons or flats' inner parts. Gnagne et al. (2017) have meanwhile shown that little shrubs (35%) are the most represented followed by herbs (29%). Béné et al. (2016), in an ethnobotanic study of medicinal plants in Ivory Coast, have underlined that it is rather little shrubs that have the great proportion (51.09%). These variations would be explained by the type of study carried out. At this, one can add the ecologic area and the sociocultural approach and type of climate.

There is a diversity of use between the phytogenitic resources that are signaled. Ornamental plants are found among those that are used as food and in phytotherapy. 65 species belonging to 33 families divided into 63 genders have been recognized as ornamental plants and

used as food. *Solonaceae* are the most represented (08, 96%) followed by *Malvaceae* (07.46%) and *Fabaceae* (05.97%). Fourteen products obtained from ornamental plants are used as food among which we have vegetables that are the most quoted (20.65%), followed by oil (10) Radji (2010) on his side has signaled 15 species for human food, whereas 03 species have been signaled for traditional cosmetics and 11 in agroalimentary. Analyses revealed that *Albizia lebbeck* and *Cassia siameca* as ebenistry wood, as biopesticide, little pepper's fruits or Cayenne's pepper (*Capsicum frutescens*) and Neem's leaves (*Azadiracthtaindica)*. As firewood, workwood and building materials and charcoal: *Acacia auriculiformis*, *Acacia mangium*, *Cassia siamea*, *Eucalyptus sp*. and *Mangifera indica*. 55 ornamental species pertaining to 33 families shared into 51 genders have been signaled as medicinal plants. *Fabaceae's* family is the most represented (05 genders and 05 species), followed by *Lamicaceae* and *Solonaceae* (03 genders and 03 species). Vegetables (20.65%) are the most quoted products, followed by oil (10%). Fruits (together with nuts) are the most used organs followed by leaves with respective proportions of 44.44 and 34.72%. Works realized by Radji (2010) revealed that 77 ornamental species pertaining to 39 families have been signaled as medicinal plants, among which the most represented families in number of species are *Apocynaceae* and *Fabaceae* (05 species), *Euphorbiaceae* and *Liliaceae* (05 species). The number of families and species during the study is lower to that found by Radji (2010) in Togo with respective numbers of 33 families; 55 species; 39 families and 77 species. Touckia et al. in s study on food plants with medicinal interest used by Pygmies in the Pissa Commune have shown that fruits (40.62%) followed by leaves (37.50%) are the most used plants' organs. Plants' use varies according to studies and sociocultural aspects. By the way, ornamental plants are not used in the same way in the different ecologic areas. Their use varies also according to the level of instruction. Bouayyadi et al. (2015) in a floristic and ethnobotanic study on the medicinal flora in Morocco have shown that over the censed 137 species, 10 are relatively most used in traditional phytotherapy by the local population. People's vulnerability having low level of education, the non- existence or rudimentary estate of sanitary infrastructures, the high cost of pharmaceutical preparations and the modicity of people's income is one of the criteria that push them to choose phytotherapy (Guedje et al., 2010). Choosing traditional medicine by vulnerable people could be explained through sociocultural reasons due to the fact that they acquired these therapeutic practices from their ancestors.

On the ethnopharmaceutical plan, 34.15% of the species are used to heal pathological blood apparatus; 25.61% is for digestive apparatus pathologies and 18.29% is for visual apparatus pathologies. As for Radji (2010), he has shown that 49% of medicinal species are used to heal digestive diseases, 17% for dermatosis, and 13% against respiratory diseases. Bouayyadi et al. (2015) have shown that the local population in the Gharb region use medicinal plants to heal mainly infections of the digestive tube (21.84%), metabolic affections (19.67%), dermatological affections (18.41%) and genito-urinary diseases (12.27%), followed by respiratory affections (07.03%), neurological affections (05.77%) and aural affections (04.87%). Medicinal plants are parts of the history of all continents; in China and in India, through centuries, knowledge concerning plants is organized, documented and is transmitted from generation to generation (CTA, 2007).

Organs of cultivated ornamental plants do not have the same representation in function of uses according to countries. The results show that leaves (38%) constitute the most used organ; but taking their samples suppresses the possibility of furnishing the plant in nutritive elements, which affects its vegetative aspect as well as its physiology (Yapi, 2013). Except for flowers (10%), the other organs do not exceed 10% in percentage of use. Radji (2010) has shown that for food plants, fruits and leaves are the most used organs. For their color which is almost green leaves is a secondary criterion for flowers' discrimination and its family, genders and species' characteristics (Assi, 2002). In Senegal, Malick (2006) has demonstrated that leaves constitute the most used organs (79%) followed by roots (18%). Ethnobotanic studies carried out by Ouattara (2006), Zerbo et al. (2007), N'Guessan (2008) Lakouéténé et al. (2009), Zerbo et al. (2011) and Diata et al. (2013) have shown that leaves are the most used organs in various therapeutic preparations according to the following respective proportions: 44.26%; 41%; 51.22%; 67%; 31% and 46%. Bouayyadi et al. (2015) works always confirm that majority use leaves (38.55%) followed by grains (12.20%, fruits (10.70%), stems with leaves (08%) and Rhizoms (07.25%). Not only the facility and fastness in the harvesting could justify the great use of leaves (Bitsindou, 1986), but also by the fact that they are the photosynthesis' siege (Bigendako-Polygenis and Lejoly, 1990). According to users, the long exposition of these organs to the sun gives them many virtues and benefits. On the scientific ground, photosynthesis enables the biosynthesis that helps metabolite stocking.

Oral administration includes the different ways of preparation: decoction, herb tea, triturating, maceration, pickling, crushing and powder. These are rules that correspond to the way of healing the post prevailing pathologies. The most quoted ways of preparation is decoction (52%) followed by herb tea (20%) and triturating (13%). Works carried out by Lakouéténé et al. (2009), Sahli et al. (2010), Benknigue et al. (2011) and Zerbo et al. (2011) have shown that potion is the pharmaceutical form which is the most yearn after with the following proportions: 47, 76, 26.80 and 58%. In an ethnobotanical and floristical study on medicinal plants in Kenitra town in Morocco, Sahi et al. (2010) signaled that decoction helps to collect more active principles and

diminishing or annihilating toxical effects of some receipts. Among ways of admission, drinking is the most quoted (53%), followed by laxative action, cataplasm and rubbing (scraping) (14%). In their analysis, N'Guessan (2008) and Dibong et al. (2011) have shown that oral way (94.44§) is the most used way of admission. Our results also confirm it. However, some works have revealed other ways such as the case of Diatta et al. (2013) for percutanea, Béné et al. (2016) for skin cutanea with respective proportions of 46% and 35%. According to the subjects, decoction would be the best way for extracting active principles. However, it can destroy some active principles of the species used (Bouayyadi et al., 2015).

Ornamental plants' multiplying techniques in Bangui and Begoua communes are done according to types of vegetables' species. Reproduction is done either through grains (seeds) (sexual way) or through vegetative multiplication. Reproduction through grains/seeds is the most used way of multiplication (53.27%), followed by cutting (30.65%). Shoot and marcottage are nevertheless the best used ways with respective proportions of 10.55 and 3.52%. Results obtained by Radji (2010) confirm that *Polylthia* gender and *Ficus* gender are characterized by two ways of reproduction (cutting and reproduction through grains/seeds). Then, one can say that reproduction through grain is the most used way of reproduction.

CONCLUSION AND PERSPECTIVES

The study carried out in the communes of Bangui and Bégoua is the first in Central African Republic; it made it possible to apprehend the diversity of the horticultural flora as well as the endogenous uses. A data based on the decorative plants in the scientific plan was made up. That could be used for the present and future generations. Although the study was carried out at the scale of two communes that account for the country, one notes one diversified significantly in decorative plants. That can be explained by its nature like political and administrative capital of the country.

The results obtained contribute in the same way to the valorization and the protection of the biodiversity; a fundamental asset for the well-being of humanity. Thus, the decorative horticulture ultimately can contribute to the efforts of conservation of biological diversity in the planetary plan.

Considering the place and the interest which grants the populations to the decorative plants, it would be judicious:

1) to continue research in the other agglomerations of the country in order to arrive at a more exhaustive inventory;
2) to develop the plants of medicinal interest through a study of the pharmacological properties with a perspective for production of phytomedicine;
3) to organize the discipline of the decorative horticulture by the reinforcement of capacity of the people resources; because it boosts economic interests and can support the efforts put in environmental protection; this is because a broad use of natural flowers in the ceremonies and decorations of various natures can contribute effectively to the reduction of the artificial decorations which influence negatively our framework of life.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Aké Assi AE (2002). Contribution à l'étude des plantes ornementales cultivées dans les régions d'Abidjan et de San-Pedro, en Côte d'ivoire. Volume 1- Textes et iconographies. Volume 2- Catalogue illustré de 241 espèces et variétés horticoles. Thèse Doctorale. 3e cycle, Univ. Cocody (République de la Côte d'Ivoire), 242 p.

APG III (2009). The Angiosperm Phylogeny Group, « An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III », Botanical Journal of the Linnean Society 161(2):105-121.

Aumeeruddy Y, Pinglo F (1989). Phytopratiques des régions tropicales. Recuei préliminaire de techniques traditionnelles d'amélioration des plantes, UNESCO, Institut de botanique/ Laboratoire de botanique tropicale, Montpelier 74 p.

Gbenou BOR, Adjakpa JB (2014). Etude ethnobotanique de *Vitex doniana* (Sweet), (Verbenaceae) dans la commune de Bonou au Benin 48 p.

Barloy JJ (1984). Le monde végétal : Les plantes dans l'évolution de la vie et des civilisations. Ed. Hachette Jeunesse, Paris 73 p.

Beina D (2011). Diversité floristique de la forêt dense semi-décidue de M'baïki, République Centrafricaine : Etude expérimentale de l'impact de deux types d'intervention sylvicole. Thèse Doctorale, Université de Picardie 226 p.

Béné K, Camara D, Fofie NBY, Kanga Y, Yapi Adon B, Yapo YC, Ambe SA, Zirihi GN (2016). Étude ethnobotanique des plantes médicinales utilisées dans le Département de Transua, District du Zanzan (Côte d'Ivoire) 21:4230-4250.

Bigendako-Polygenis MJ, Lejoly J (1990). La pharmacopée traditionnelle au Burundi. Pesticides et médicaments en santé animale. Presse Universitaire. Namur pp. 425-442.

Bitsindou M (1986). Enquête sur la phytothérapie traditionnelle à Kindamba et Odzala (Congo) et analyse de convergence d'usage des plantes médicinale en Afrique centrale, Univ. Libre de Bruxelles 482 p.

Bouayyadi L, Mohamed El Hafian (2015). Étude floristique et ethnobotanique de la flore médicinale dans la région du Gharb, Maroc, Journal of Applied Biosciences 93:8760-8769.

Benkhnigue O, Zidane L, Fadli M, Elyacoubi H, Rochdi A, Douira A (2011). Étude ethnobotanique des plantes médicinales dans la région de Mechraâ Bel Ksiri (Région du Gharbdu Maroc). Acta Bot. Barc. 53:191-216.

Boisson de Chazournes L (2009). La convention sur la diversité biologique et son protocole sur la biosécurité, 10 p.

Brethour C, Watson G, Sparling B, Bucknell D, Moore T (2007). Revue de la littérature sur les bienfaits des produits de l'horticulture ornementale sur la santé et l'environnement, Rapport final, George Morris Centre 76 p.

Chevallier A (1896). Encyclopédie médicinale de l'Afrique. Larousse afrique 1150 p.

Colson F, Dattée, Dorion et L (2016). Colloque et séance de l'Académie d'Agriculture de France, Agrocampus Ouest-Angers 78 p.

CTA (2007). Les plantes médicinales. Programme de radio rurale. No 07/3. Postbus 380 6700 AJ Wageningen, Pays-Bas 35 p. https://www.doc-developpement-durable.org/file/Plantes-Medicinales-Aromatiques/generalites%20sur%20les%20plantes%20medicinales.p

df
CTA (1992). Culture des fleurs à couper. Le Technicien d'Agriculture Tropicale, édition Moissonneuse et Larose, rue Victor-Cousin F 75005, Paris 136 p.
CTFT (1989). Mémento du forestier, Ministère de la coopération 3e éd., Ministère de la Coopération et de Développement 1259 p.
MCD (1991). Mémento de l'Agronome, Ministère de la coopération, Ministère de la Coopération et du Développement 1635 p.
Diatta CD, Gueye M, Akpo LE (2013). Les plantes médicinales utilisées contre les dermatoses dans la pharmacopée Baïnounk de Djibonker, région de Ziguinchor (Sénégal). Journal of Applied Biosciences 70:5599-5607.
Dibong SD, Mpondo Mpondo E, Ngoye A, Kwin MF, Betti JL (2011). Ethnobotanique et phytomédecine des plantes médicinales de Douala, Cameroun. Journal of Applied Biosciences 37:2496-2507.
Diop RD, Mbaye MS, Noba K (2017). La flore du conservatoire botanique Michel Adanson de Mbour (Sénégal) : perspective pour un plan d'aménagement et de gestion 13 p.
Gnagne AS, Camara D, Fofie N'Guessan Bra Y, Bene K, Guédé Zirihi N (2017). Étude ethnobotanique des plantes médicinales utilisées dans le traitement du diabète dans le Département de Zouénoula (Côte d'Ivoire) 113:11257-11266.
Guedje NM, Ntungwen Fokunang C, Tafokou JiofackR B, Dongmo R (2010). Opportunités d'une exploitation soutenue des plantes médicinales dans l'aménagement forestier. International Journal of Biological and Chemical Sciences 4(4):1346-1372.
Guignard JL (1983). Abrégé de botanique. Masson 2è édition revue et augmentée 592 p.
Jaffee S, Masakure O (2005). Strategic use of private standards to enhance international competitiveness: Vegatable exports from Kenya and elsewhere. Food Policy 30:316-333.
Koyt-Deballé GF, Kosh-Komba E (2015). Les plantes de Centrafrique et leurs usages endogènes, Editions Universitaire Européennes 662 p.
Kosh-Komba E (2013). Gestion paysanne, diversité agromorphologique et génétique de *Manihot esculenta* CRANTZ cultivée dans trois zones agro climatiques en République Centrafricaine. Thèse Doctorale, Université de Lome 197 p.
Klotoe AP (2015). Etude Ethnobotanique de *Thevetia peruviana* K. schum (Apocynaceae) dans les Communes de Bohicon et de Za-kpota au Bénin 42 p.
Kroll R (1992). Culture des fleurs à couper. Agence de Coopération Culturelle et Technique, 13, quai André Citröen F 75015 Paris CTA 136 p.
Larousse Afrique (1986). Encyclopédie médicinale de l'Afrique, 1150 p.
Lakouéténé DPB, Ndolngar G, Berké B, Moyen J-M, Kosh-Komba É, Zinga I, Silla S, Millogo Rasolodimby J, Vincendeau P, Syssa-Magalé J-L, Nacoulma-Ouedraogo OG, Laganier R, Badoc A, Chèze C (2009). Enquête ethnobotanique des plantes utilisées dans le traitement du paludisme à Bangui. Bull. Soc. Pharm. Bordeaux 148:123-138.
Letouzey R (1969-1982). Manuel de botanique forestière tome 1, CTFT, 461 p.
Maaoui M (2014). Atlas des plantes ornementales des ziban. Edition CRSTRA 332 p.
Malick Amadou LY (2006). Contribution à l'étude ethnobotanique et ethno pharmacologique des plantes médicinales sénégalaises dans le traitement l'hypertension artérielle 130 p.
Maydell H (1990). Arbres et arbustes du sahel. Leurs caractéristiques et leurs utilisations. Gtz 531 p.
Mboh H (2001). Vegetation assessment of Takamanda forest reserve and comparison with Campo Ma'an and Ejagham forest reserves, Mémoire dissertation, Faculty of Agronomy and Agricultural Sciences, University of Dschang, Cameroon 62 p.
MCD (1991). Mémento de l'Agronome, Collection « Techniques Rurales en Afrique », 4 edition 1635 p. ISBN 2-11-086725-6
N'Guessan K (2008). Plantes médicinales et pratiques médicales traditionnelles chez les peuples Abbey et Krobou du département d'Agboville (Côte d'Ivoire).Thèse de Doctorat d'Etat ès Sciences, Université de Cocody-Abidjan (Côte d'Ivoire) 235 p.
Neven DO, Odera MM, Rardon T, Wang H (2009). Kenya Supermarkets, Emerging Middle-Class Horticultural Farmers, and Employment Impacts on the Rural Poor. World Development 37(11):1802-1811.
Ouattara D (2006). Contribution à l'inventaire des plantes médicinales significatives utilisées dans la région de Divo (sud forestier de la Côte-d'Ivoire) et à la diagnose du poivrier de Guinée: *Xylopia aethiopica* (Dunal) A. Rich. (Annonaceae). Thèse de Doctorat, Université de Cocody-Abidjan (Côte d'Ivoire) 184 p.
Saulnier P (1995). Plantes médicinales et soins en Centrafrique 4e édition revue et augmentée. Centre Pastoral-Bangui. 165 p.
Radji AR (2010). Recherches sur la flore horticole ornementale du Togo : diversités, fonctions et valeurs. Thèse Doctorale, Université de Lomé 192 p.
Radji R et Kokou K (2013). Classification et valeurs thérapeutiques des plantes ornementales du Togo, Québec, Vertigo 33 p.
Roy D, Thorat A (2008). Success in High Value Horticultural Export Markets for the Small Farmers: The case of Mahagrapes in India. World development 36(10):1874-1890.
Salhi S, Fadli M, Zidane L, Douira A (2010). Études floristique et ethnobotanique des plantes médicinales de la ville de Kénitra (Maroc). Lazaroa 31:133-146.
UICN (1994). Putting plans into action. Peport of Metropolitan Open Space Systems (MOSS) International Conference, Durban, African du Sud.
Viguier M (2006). Les perspectives économiques de l'horticulture. Avis et rapports du Conseil Economique et Social. Paris 184 p.
Watson G (2006). Overview of the Canadian Horticulture Industry. Introduction to the Floriculture Crop Profile Series. Centre pour la lutte antiparasitaire d'AAC (non publié).
Waylen K (2006). Botanic Gardens: Using Biodiversity to Improve Human Well-Being, Botanic Gardens Conservation International.
World Wild Faune (WWF) et International Union for Conservation of Nature (IUCN), 1994, Centers of plant diversity. À guide and strategy for their conservation Vol. 1, IUCN publication units, Cambridge, UK. 335 p.
Yapi AB (2013). Inventaire des plantes médicinales de la famille des Asteraceae des marchés de la commune d'Abobo (Abidjan, Côte d'Ivoire). Mémoire de Master II de botanique, UFR Biosciences, Université Félix Houphouët-Boigny 50 p.
Zerbo P, Millogo-Rasolodimby J, Nacoulma Ouedraogo OG, Van Damme P (2007). Contribution à la connaissance des plantes médicinales utilisées dans les soins infantiles en pays San, au Burkina Faso. International Journal of Biological and Chemical Sciences 1(3):262-274.
Zerbo P, Millogo-Rasolodimby J, Nacoulma-Ouedraogo OG, Van Damme P (2011). Plantes médicinales et pratiques médicales au Burkina Faso: cas des Sanan. Bois et forêts des tropiques 307(1):41-53.