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Floristic Survey and Wild Oilseed Plants Frequency in Lwiro and Idjwi Island Ecosystems in Albertine Rift

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ABSTRACT

This study describes the floristic diversity and wild oilseed plants frequency of Lwiro and Idjwi Island ecosystems in DR Congolese Albertine Rift area. Total of 1689 plant of DBH ≥ 10 cm were recorded in plots and along rivers and streams. 92 plant species were inventoried with species repetition in different prospected stations: 36 species were identified at Lwiro station, 33 species at Washiha station and 43 species in Nyamusisi station. There were 8 species found at the same time at Lwiro and Idjwi Island ecosystems. The trees morphological type is the most abundant in the two stations (Lwiro and Nyamusisi) than in Washiha and more in Nyamusisi. The dominant families are Euphorbiaceae and Fabaceae. In total of 1689 individuals in all three sites, 292 are oilseed plants shared out 14 individuals i.e 3.78% at Lwiro station, 99 individuals i.e 15.59% in Washiha station and 179 individuals i.e 26.17% in Nyamusisi station. Nyamusisi station is very rich in wild oilseed-bearing plants with all dominant trees species reported as oilseed plants. The high proportion of trees morphological types in prospected stations brings vulnerability to these ecosystems due to high intensity of human disturbance attracted by timber and charcoal extraction. Chemical evaluation of oils from some selected wild oilseed can establish these plants as source oil for various uses. The trees species identified as sources of oil will be proposed for domestication and at the same time be conserved which is good for the environment.

Keyword: *Oilseed plant; Lwiro station; Washiha station; Nyamusisi station; Idjwi Island; Albertine Rift.*

INTRODUCTION

Plant composition is what defines most habitats in the world and this in turn defines the presence or absence of many species of animal (Plumptre *et al*., 2003). Consequently it is important to attempt to assess plant diversity in this area of Albertine Rift. Also as evidence linking health benefits to the consumption of plant oils continues to grow, there is need for the search of new sources of oil (Mohammed *et al*., 2003; Parry, 2006). Thus, it is necessary to highlight the importance of some local plants to support rural people's needs in the ways that are in harmony with environment.

In Democratic Republic of Congo (RDC), the oil for nutritional purpose and derivate products have become more unaffordable for most people because the sources of these products are very small and limited (ABC, 2003). Forests and rural lands of the DRC contain many plants which can be developed as new source of oils for food products and industry (Kabele, 1975). In preceding studies conducted in and around Kahuzi-Biega National Park, DRC more than 40 oil producing plant species were identified and oil content from these species was determined. Also crude oils from some plant species have been analyzed and found having the potential of being utilized as source of oil for economic purposes (Kazadi, 1999; Kazadi, 2011).

Lwiro and Idjwi Island are in Sud-Kivu Province, in central area of the Albertine Rift, at East of Democratic Republic of Congo. Lwiro ecosystem is in surrounding areas of Kahuzi-Biega National Park (KBNP) at its eastern side and Idjwi Island is located in Lake Kivu. Since last twenty years, the Kivu Province is experiencing a conservation and resource management crisis (CI, 2006). Thus KBNP in spite of its fully functioning protected areas status and the forests of Idjwi Island all two regions being in the vicinity of Bukavu city are all under this threat.

The KBNP is in junction of the Guineo–Congolian phytochorion with parts of the Afromontane and Zambezian phytochoria. It is the second station more important in the region concerning species endemism and in relation to species richness (CSB, 2014). Idjwi Island on its two coast eatern and western has attractiveness beaches and others touristic sites as small islands, capes and bays. The Nyamusisi forest is the biggest natural reserve of the Island but it is threatened to becoming extinct (Tshiakani *et al*., 2004).

Many works are carried out on biodiversities of Albertine Rift on its zoological side, while the botanical side is less

investigated. However, some plants species are traditionally used as sources of many products most for rural communities like fire wood, timber, food, etc... . The most frequent use of wild plants is as herbal medicines (Ithe *et al*., 2014).

This work presents part of the results of the biodiversity inventories of a multidisciplinary study in Congolese Albertine Rift area, within the framework of the *Programme Biodiversité des Ecosystèmes Aquatique et Terrestre du Rift Albertin* (P-BEATRA). Thus a floristic survey has been made in Lwiro and Idjwi Island ecosystems. This study allowed to determinate the species composition, species richness and diversity and tree species of different investigated stations. Also among plant species, frequency of wild oilseed plants, potential new sources of oil for various uses was carried out.

MATERIAL AND METHODS

Study area

a. The Lwiro ecosystem

The Lwiro station (Fig. 1) lies in the surrounding areas of KBNP at its eastern side between 28°48' longitude East and 2°15' latitude south, at an altitude of 1750 m. It is located 45 Km North of Bukavu city and 7 km West of Lake Kivu. Two locations were investigated in this area: the first is a small natural reserve of *Centre de Recherche en Sciences Naturelles* (CRSN) currently used for chimpanzees and monkeys sanctuary for recuperated orphans apes. The second is a large LUSHALA swamp near the CRSN. Additional floristic survey was carried out along KABINDI River and streams. In the whole, the climate in the region is characterized by a short dry season (June-August) and a distinct long rainy season from September to May. A mean annual rainfall of 1,619 mm/year has been recorded for a period of 14 years while the monthly mean temperature noted was of about 20°C (Basabose, 2004).

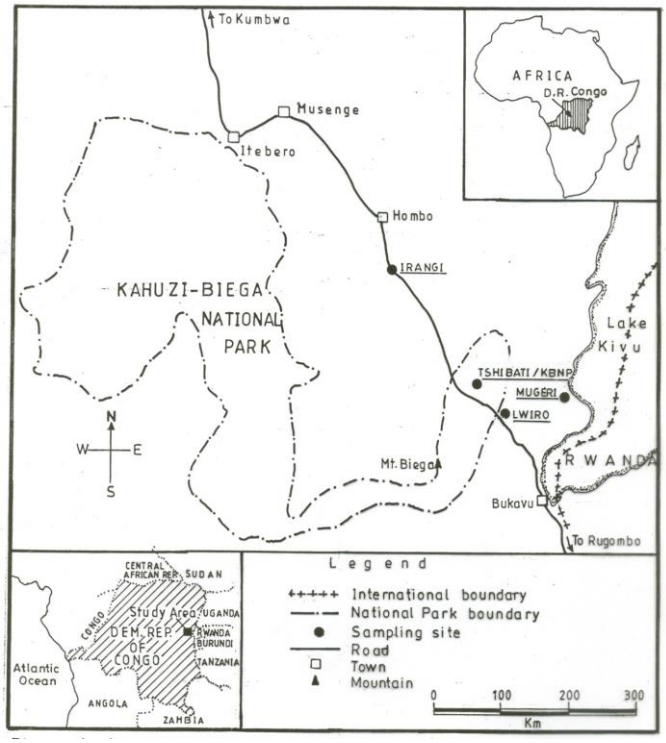


Figure 1: Lwiro region in the surrounding areas of Kahuzi-Biega National Park in DR Congolese Albertine Rift area (Kazadi, 2011)

a. The Idjwi Island ecosystem

Idjwi is a Territory of South Kivu Province in the DRC. It lies (Fig. 2) in Lake Kivu along the border between Rwanda and the DRC at the highest segment of the Albertine Rift. The narrow island stretches 40 kilometers down the center of Lake Kivu to cover an estimated 286 square kilometers. Average temperature is approximately 18°C and annual rainfall is approximately 1,397 mm/year. The climate provides a long and reliable growing season for a variety of crops, but increasing population and deforestation are quickly decreasing the amount of arable land per capita (Thomson *et al*., 2011). The Lake Kivu lies nearly 1,500 m above sea level, and is surrounded by mountains over 2,000 m, which descend precipitously to the waterfront. Before densely forested, the island was home to little endemic vegetation, having been replaced by cassava fields to feed the growing population (Hadley *et al*., 2011; Kizungu *et al*., 2002).

Figure 2. Satellite image, Idjwi Island (center) in Lake Kivu in DR Congolese Albertine Rift area (Hadley et al., 2011).

The Nyamusisi forest which had an extent of 2300 ha until 1985 is at present much reduced (Kizungu *et al*., 2002). Currently the vegetation is predominantly constituted with trees, shrub and lianas in herbs of ferns including *Pteridium aquilinum*, *Mimulopsis spp* and *Cyathea manniana*. There is also the Washiha reserve in the Northern part of Idjwi Island which contains many trees of *Piptadeniastrum africanum*. Also additional floristic survey was carried out along rivers and streams of Nyamusisi forest.

Fieldwork

Sampling techniques

The fieldwork investigations were made by a team of 4 persons during 3 days at Lwiro, 4 days in Washiha forest and 6 days in Nyamusisi forest. Sample areas were selected from within the 3 different stations. This was to be able to get representative samples from all the three stations. Five sampling point 20x1000 meters plots were erected in three stations: two at

Lwiro, one at Washiha and two at Nyamusisi. Plots were erected following the compass direction in order to evaluate the floristic richness of the investigated station. Each of the 20x1000m plots were sectioned into two 20x100m subplots. The fieldwork was carried out in July 2001.

Vegetation assessment

For each of the five 20x1000m plots erected in each station, all the different plants species (trees, shrubs and lianas) present were identified counted the diameter at breast height (DBH) measured and then recorded. Only plants found with DBH ≥ 10 cm were recorded. Measurement was taken in circumference at breast height using tape measure and later on converted into diameter. The DBH was measured at 1.3 m above ground or immediately above the buttresses if these extend beyond 1.3 m. Identification was done using vegetative field characteristics with the help of some books and articles as APG III, (2009); Troupin (1978), (1983), (1985); Bashonga (1998) and Edwards (1997); also with help of para-taxonomists and experienced botanists at the herbarium of CRSN/ Lwiro. Measuring and counting in each 20x1000m plots were carried out by recording trees shrubs and lianas ranging from 10cm DBH and above in entire plot and seedlings identified (DBH not taken) in 1x1m quadrates. GPS apparatus (model Garmin Coorp 2000-etrex Summit) was used to record geographic coordinates; secateurs were used to cut off plant specimens which were collected in large plastic collecting bag. In Lwiro and Nyamusisi, additional floristic survey was carried out along rivers and streams on about 5 Km using Rapid-Assessment Programs (RAP) (ABATE, 1992). Field data were recorded on data entry sheets on data recording form containing plant species name, date, recorder, plot ID number, serial no., size (DBH) and comments/conditions. The voucher specimens and complete set of all fertile herbarium specimens were brought to the herbarium of *CRSN/* Lwiro for identification.

Data Analysis

Species lists were established and used to determine the species richness and abundance for the different 3 studied stations. Statistics analyses were carried out using Past (PAlaeontological STatistics) software. Thus Shannon-Weaver diversity index was used to determine species diversity and also Jaccard similarity index (IJ) and Piélou equitability index (EQ) were established (Grall and Hily, 2003; Hammer et al., 2001). Shannon-Weaver diversity index (H') is the most used to express species diversity (Tabuti, 2007).

After establishing check-list of inventoried plant species, the determination of wild oilseed plant was done using previous works as Adriens (1944); Kabele (1975); Kazadi (2011). In order to assign an importance value to a species, family and to wild oilseed plants, the relative frequency was determined using the following formula:

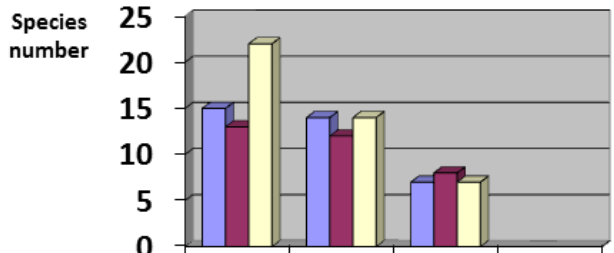
$$Fr = \frac{Numbe\ r\ of\ individuals\ of\ a\ taxon}{total\ \ number\ of\ individuals}\ X\ 100$$

Where Fr: relative frequency (Valkenburg J. & al., 1998).

RESULTS AND DISCUSSION

1. Morphological types Analysis

In total 92 plant species were inventoried with species repetition in different prospected stations: 36 species were identified at Lwiro station, 33 species at Washiha station and 43 species in Nyamusisi station. There were 8 species found at the same time at Lwiro and Idjwi Island ecosystems. The trees morphological type is the most abundant in the two stations (Lwiro and Nyamusisi). There was above all high proportion in Nyamusisi station with 22 trees species or 19.6% (Table 1 in annex and Figure 3).



	Tree	Shrub	Liana	
Lwiro	15	14	7	
Washiha	13	12	8	
Nyamusisi	22	14	7	

Figure 3: Morphological types of plant species of Lwiro, Washiha and Nyamusisi stations in DR Congolese Albertine Rift area

2. Species richness and diversity

In the three stations of investigation, the high proportion of trees morphological types. Following the check-list in Table 1 and Figure 4, there is high diversity in three stations prospected. The dominant families concerning plant species number are Euphorbiaceae, Fabaceae, Moraceae and Rubiaceae with each respectively 8%. About plant individuals number the dominant families are Euphorbiaceae, Fabaceae , Rubiaceae and Ochnaceae with respectively 15.9%, 13.2%, 10.4% and 7.4%.

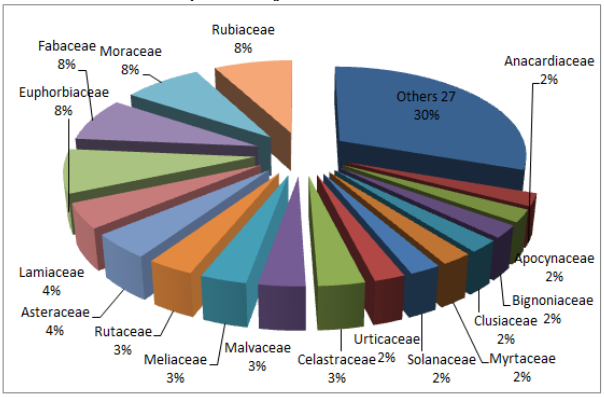


Figure 4. Plant species number families' importance in Lwiro, Washiha and Nyamusisi stations in DR Congolese Albertine Rift area

In Nyamusisi station there is high proportion of submontane species with high frequency of *Symphonia globulifera* followed by *Parinari excelsa* and *Strombosia scheffleri*. Washiha station had *Piptadeniastrum africanum* with more high proportion of

23.3% followed by the shrubs as *Sericanthe leonardii*, *Alchornea hirtella* and *Campylospermum vogellii* having respectively 22.7% ; 22.2% and 19.7%. The station of Nyamusisi station had the highest species richness with 43 species followed by Lwiro with 36 species and Washiha station with 33 species. Following the Table 2, the high Shannon-Weaver diversity indices obtained of about 3, confirm high species diversity in the studied stations. The diversity is higher in Lwiro and Nyamusisi than in Washiha station. Nevertheless, the Piélou equitability indices reflect high equitable species diversity in all 3 stations because all 3 EQ are more than 50% (0.8072; 0.6676 and 0.7662 respectively for Lwiro, Washiha and Nyamusisi). Conversely, the equitability of Washiha station (0.6676) is less than 2 others.

Table 1 : Floristic analysis of plant species of Lwiro, Washiha and Nyamusisi stations in DR Congolese Albertine Rift area

		Station of Lwiro				**Station of Washiha station, Idjwi Island**				**Station of Nyamusisi station, Idjwi Island**			
Plant scientific name	**Family**	**TM**	**NI**	**P**	**Fr**	**TM**	**NI**	**P**	**Fr**	**TM**	**NI**	**P**	**Fr**
1. Acacia monticola	Fabaceae	-	-	-	-	-	-	-	-	L	2	0.3	0.3
2. Acanthaceae inconnue	Acanthaceae	-	-	-	-	-	-	-	-	Sh	1	0.1	0.1
3. Acanthus pubescens	Scanthaceae	Sh	6	1.6	1.6	-	-	-	-	-	-	-	-
4. Adenia bequaertii	Passifloraceae	-	-	-	-	-	-	-	-	L	1	0.1	0.1
5. Alangium chinense	Alangiaceae	T	5	1.4	1.4	-	-	-	-	-	-	-	-
6. Albizia grandibracteata	Fabaceae	T	14	3.8	3.8	-	-	-	-	-	-	-	-
7. Albizia gummifera	Fabaceae	-	-	-	-	T	2	0.3	0.3	T	1	0.1	0.1
8. Alchornea cordifolia	Euphorbiaceae	-	-	-	-	Sh	4	0.6	0.63	-	-	-	-
9. Alchornea hirtella	Euphorbiaceae	-	-	-	-	Sh	2	0.3	0.3	Sh	150	21.9	21.9
10. Allophyllus africanus	Sapindaceae	-	-	-	-	Sh	19	3	2.99	-	-	-	-
11. Annonaceae inconnue	Annonaceae	-	-	-	-	-	-	-	-	L	1	0.1	0.1
12. Anthocleista grandiflora	Loganiaceae	-	-	-	-	T	2	0.3	0.3	T	3	0.4	0.4
13. Antiaris toxicaria	Moraceae	-	-	-	-	T	7	1.1	1.1	-	-	-	-
14. Bersama abyssinica	Meliaceae	-	-	-	-	-	-	-	-	Sh	1	0.1	0.15
15. Bridelia micrantha	Asteraceae	Sh	2	0.5	0.5	-	-	-	-	T	7	1	1
16. Caloncoba glauca	Salicaceae	Sh	5	1.4	1.4	-	-	-	-	-	-	-	-
17. Campylospermum vogelii	Ochnaceae	-	-	-	-	Sh	125	19.7	19.7	-	-	-	-
18. Canthium sp	Rubiaceae	Sh	14	3.8	3.8	-	-	-	-	-	-	-	-
19. Canthium sp1	Rubiaceae	-	-	-	-	Sh	7	1.1	1.1	-	-	-	-
20. Canthium sp2	Rubiaceae	-	-	-	-	Sh	1	0.2	0.2	-	-	-	-
21. Carapa grandiflora	Meliaceae	-	-	-	-	-	-	-	-	T	20	2.9	2.92

22. *Chrysophyllum gorungosanum*	Sapotaceae	-	-	-	-	-	-	-	-	T	9	1.3	1.3
23. *Clematis hirsuta*	Ranunculaceae	L	9	2.4	2.4	-	-	-	-	-	-	-	-
24. *Clerodendrum capitatum*	Lamiaceae	-	-	-	-	L	7	1.1	1.1	-	-	-	-
25. *Clerodendrum sp1*	Lamiaceae	-	-	-	-	Sh	1	0.2	0.2	-	-	-	-
26. *Clerodendrum sp2*	Lamiaceae	-	-	-	-	L	3	0.5	0.5	-	-	-	-
27. *Conopharyngia durissima*	Verbanaceae	-	-	-	-	Sh	5	0.8	0.79	-	-	-	-
28. *Croton megalocarpus*	Euphorbiaceae	-	-	-	-	-	-	-	-	T	2	0.3	0.3
29. *Cyathea manniana*	Cyatheaceae	-	-	-	-	-	-	-	-	Sh	17	2.5	2.5
30. *Dichaetanthera corymbosa*	Melastomataceae	-	-	-	-	-	-	-	-	Sh	4	0.6	0.6
31. *Dracaena afromontana*	Asparagaceae	-	-	-	-	-	-	-	-	Sh	1	0.1	0.1
32. *Ekebergia capensis*	Meliaceae	-	-	-	-	T	3	0.5	0.47	-	-	-	-
33. *Erythrina abyssinica*	Fabaceae	T	45	12.2	12.2	-	-	-	-	-	-	-	-
34. *Erythrococca bongensis*	Euphorbiaceae	Sh	2	0.5	0.5	-	-	-	-	-	-	-	-
35. *Fagara sp*	Rutaceae	-	-	-	-	T	1	0.2	0.16	-	-	-	-
36. *Ficus capensis*	Moraceae	T	6	1.6	1.6	-	-	-	-	-	-	-	-
37. *Ficus glumosa*	Moraceae	T	1	0.3	0.3	-	-	-	-	-	-	-	-
38. *Ficus sp1*	Moraceae	-	-	-	-	L	8	1.3	1.3	L	1	0.1	0.1
39. *Ficus sp2*	Moraceae	-	-	-	-	T	1	0.2	0.2	T	1	0.1	0.1
40. *Ficus vallis-choudae*	Moraceae	T	14	3.8	3.8	-	-	-	-	-	-	-	-
41. *Ficus vogelii*	Moraceae	T	2	0.5	0.5	-	-	-	-	-	-	-	-
42. *Galiniera coffeoides*	Rubiaceae	Sh	1	0.3	0.3	-	-	-	-	-	-	-	-
43. *Gouania longispicata*	Rhamnaceae	L	7	1.9	1.9	-	-	-	-	-	-	-	-
44. *Grewia similis*	Malvaceae	-	-	-	-	-	-	-	-	Sh	20	2.9	2.9
45. *Gynura ruwenzoriensis*	Asteraceae	L	4	1.1	1.1	-	-	-	-	-	-	-	-
46. *Harungana madagascariensis*	Clusiaceae	-	-	-	-	-	-	-	-	Sh	6	0.9	0.9
47. *Indéterminé*		-	-	-	-	-	-	-	-	Sh	2	0.3	0.3
48. *Jaundea pinnata*	Connaraceae	-	-	-	-	L	35	5.5	5.5	-	-	-	-
49. *Laggera alata*	Asteraceae	Sh	1	0.3	0.3	-	-	-	-	-	-	-	-
50. *Lamiaceae sp1*	Lamiaceae	-	-	-	-	-	-	-	-	Sh	1	0.1	0.1
51. *Liane sp1*		-	-	-	-	L	1	0.2	0.2	-	-	-	-
52. *Liane sp2*		-	-	-	-	L	1	0.2	0.2	-	-	-	-
53. *Lobelia giberroa*	Lobeliaceae	-	-	-	-	-	-	-	-	Sh	17	2.5	2.5
54. *Macaranga spinosa*	Euphorbiaceae	-	-	-	-	-	-	-	-	Sh	77	11.3	11.3
55. *Maesa lanceolata*	Myrsinaceae	T	19	5.1	5.1	T	2	0.3	0.3	T	14	2	2
56. *Malvaceae inconnue*	Malvaceae	-	-	-	-	-	-	-	-	T	1	0.1	0.1
57. *Markhamia lutea*	bignoniaceae	T	3	0.8	0.8	-	-	-	-	-	-	-	-
58. *Maytenus buchanani*	Celastraceae	-	-	-	-	Sh	2	0.3	0.3	-	-	-	-
59. *Maytenus arbutifolia*	Celastraceae	-	-	-	-	Sh	16	2.5	2.5	-	-	-	-
60. *Milletia dura*	Fabaceae	T	9	2.4	2.4	-	-	-	-	-	-	-	-
61. *Myrianthus arboreus*	Moraceae	-	-	-	-	-	-	-	-	T	10	1.5	1.46
62. *Myrtaceae sp1*	Myrtaceae	-	-	-	-	T	3	0.5	0.5	T	8	1.2	1.2
63. *Ocotea usambarensis*	Lauraceae	-	-	-	-	-	-	-	-	T	10	1.5	1.5
64. *Parinari excelsa*	Chrysobalanaceae	-	-	-	-	-	-	-	-	T	43	6.3	6.29
65. *Pavetta oliveriana*	Rubiaceae	-	-	-	-	Sh	6	0.9	0.9	-	-	-	-

66. Periploca linearifolia	Apocynaceae	L	1	0.3	0.3	-	-	-	-	-	-	-	-
67. Phytolacca dodecandra	Phytolaccaceae	L	9	2.4	2.4	-	-	-	-	-	-	-	-
68. Piptadeniastrum africanum	Fabaceae	-	-	-	-	T	144	22.7	22.7	T	4	0.6	0.6
69. Polyscias fulva	Araliaceae	T	2	0.5	0.5	T	3	0.5	0.5	T	21	3.1	3.1
70. Pseudospondias microcarpa	Anacardiaceae	T	3	0.8	0.8	T	10	1.6	1.6	-	-	-	-
71. Rhoicissus tridentata	Vitaceae	L	71	19.2	19.2	-	-	-	-	-	-	-	-
72. Rhus vulgaris	Anacardiaceae	Sh	2	0.5	0.5	-	-	-	-	-	-	-	-
73. Rubiaceae sp1	Rubiaceae	-	-	-	-	-	-	-	-	Sh	3	0.4	0.4
74. Salacia erecta	Celastraceae	-	-	-	-	L	7	1.1	1.1	L	1	0.1	0.1
75. Sapium ellipticum	Euphorbiaceae	T	1	0.3	0.3	T	6	0.9	0.94	T	23	3.4	3.36
76. Securinega virosa	Euphorbiaceae	Sh	1	0.3	0.3	-	-	-	-	-	-	-	-
77. Sericanthe leonardii	Rubiaceae	-	-	-	-	Sh	144	22.7	22.7	-	-	-	-
78. Solanum giganteum	Solanaceae	Sh	4	1.1	1.1	-	-	-	-	Sh	59	8.6	8.6
79. Solanum mauritianum	Solanaceae	Sh	9	2.4	2.4	-	-	-	-	-	-	-	-
80. Spathodea campanulata	Bignoniaceae	T	2	0.5	0.5	-	-	-	-	-	-	-	-
81. Sterculia tragacantha	Malvaceae	-	-	-	-	T	44	6.9	6.93	-	-	-	-
82. Strombosia scheffleri	Olacaceae	-	-	-	-	-	-	-	-	T	42	6.1	6.14
83. Strophanthus sp	Apocynaceae	-	-	-	-	L	13	2	2.05	L	1	0.1	0.15
84. Symphonia globulifera	Clusiaceae	-	-	-	-	-	-	-	-	T	50	7.3	7.31
85. Syzygium cordatum	Myrtaceae	T	14	3.8	3.8	-	-	-	-	T	1	0.1	0.15
86. Tephrosia vogelii	Fabaceae	Sh	2	0.5	0.5	-	-	-	-	-	-	-	-
87. Toddalia asiatica	Rutaceae	L	54	14.6	14.6	-	-	-	-	-	-	-	-
88. Trema orientalis	Cannabaceae	Sh	11	3	3	-	-	-	-	T	17	2.5	2.5
89. Urera camerounensis	Urticaceae	-	-	-	-	-	-	-	-	L	6	0.9	0.9
90. Vernonia amygdalina	Asteraceae	Sh	15	4.1	4.1	-	-	-	-	-	-	-	-
91. Xymalos monospora	Monimiaceae	-	-	-	-	-	-	-	-	T	24	3.5	3.5
92. Zantoxyllum gilletii	Rutaceae	-	-	-	-	-	-	-	-	T	1	0.1	0.1
TOTAL			**370**				**635**				**684**		

Legend : TM : Morphological type; NI : Individuals number; P : Proportion ; Fr : relative frequency.

Table 2: Species diversity and equitability in studied stations

	Lwiro	**Washiha**	**Nyamusisi**
Taxa_S:	36	33	43
Individuals:	370	633	684
Shannon_H:	2,892	2,334	2,882
Equitability_J:	0,8072	0,6676	0,7662

The high proportion of trees morphological types in Nyamusisi station reflects climacic ecosystems of high value. The trees as *Piptadeniastrum africanum* had high value (22.7%) in Washiha and very low in Nyamusisi while the *Sericanthe leonardii* species is more recorded only in Washiha with 144 individuals. This case is an illustration of local dominance of certain species.

Following the figure 5, there is more species similarty between Washiha and Nyamusisi stations than between them and the Lwiro station. Even that it is only 20% of species similarity among Washiha and Nyamusisi, while there is 10% of species similarty among those 2 stations and Lwiro. Thus, the occurrence of 8 plant species reported at the same time in Lwiro and Idjwi ecosystems i.e. *Bridelia micrantha, Maesa lanceolata, Polyscias fulva, Pseudospondias microcarpa, Sapium ellipticum, Solanum giganteum, Syzygium cordatum* and *Trema orientalis* can give an idea about old interconnections between the two types of vegetation. At Lwiro *Erythrina abyssinica* is the dominant tree with the proportion of 12.2% with *Vernonia amygdalina* and *Canthium sp*. as dominant shrub and also with two lianas species *Rhoicissus tridentata* and *Toddalia asiatica*.

3. Wild oilseed-bearing plants relative frequency

As indicated in Table 3 below in whole 92 plant species inventoried, 19 species were identified as wild oilseed-bearing plants. At Lwiro 3 plant species are oilseed-bearing plants: *Milletia dura, Pseudospondias microcarpa* and *Tephrosia vogelii* and in Washiha station 8 species which essentially *Sterculia tragacantha, Pseudospondias microcarpa, Ekebergia capensis* and some lianas and shrubs. About Nyamusisi station there were 10 oilseed-bearing plants species including all dominant tree species in this forest i.e. *Parinari excelsa, Strombosia scheffleri* and *Symphonia globulifera*.

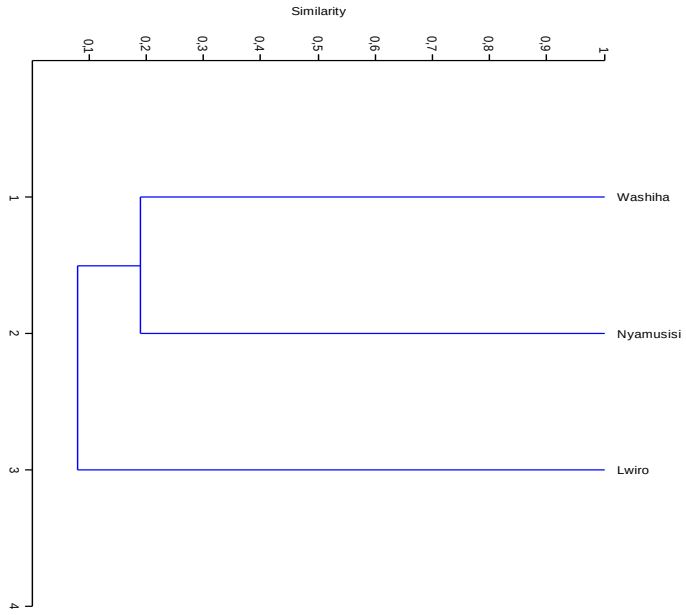


Figure 5: Species similarity between Lwiro, Washiha and Nyamusisi stations

Table 3. Individuals number of Wild oilseed-bearing plants species of Lwiro, Washiha and Nyamusisi stations in DR Congolese Albertine Rift area

	Plant individuals number		
Plant scientific name	**Lwiro**	**Washiha**	**Nyamusisi**
1. Alchornea cordifolia	-	4	-
2. Allophyllus africanus	-	19	-
3. Bersama abyssinica	-	-	1
4. Carapa grandiflora	-	-	20
5. Chrysophyllum gorungosanum	-	-	9
6. Conopharyngia durissima	-	5	-
7. Croton megalocarpus	-	-	2
8. Dracaena afromontana	-	-	1
9. Ekebergia capensis	-	3	-
10. Fagara sp	-	1	-
11. Milletia dura	9	-	-
12. Myrianthus arboreus	-	-	10
13. Parinari excelsa	-	-	43
14. Pseudospondias microcarpa	3	10	-
15. Sterculia tragacantha	-	44	-
16. Strombosia scheffleri	-	-	42
17. Strophanthus sp	-	13	1
18. Symphonia globulifera	-	-	50
19. Tephrosia vogelii	2	-	-
Total number of individuals	**14**	**99**	**179**

In total of 1689 individuals in all three stations, 292 are oilseed plants shared out 14 individuals i.e 3.78% at Lwiro, 99 individuals i.e 15.59% in Washiha station and 179 individuals i.e. 26.17% in Nyamusisi station. Nyamusisi station is very rich in wild oilseed-bearing plants with all dominant trees species reported as oilseed plants because of its large size and diverse habitats. Unlike to this, Lwiro and surrounds region had less wild oilseed-bearing plant species due to anthropogenic disturbance events (agricultural fields or settlements). Many oilseed-bearing plants reported early in Lwiro station (Kazadi, 1999; 2011) are not in their wild or natural state but cultivated and in instance of domestication more for timber exploitation and charcoal burning.

CONCLUSION

In Lwiro, Washiha and Nyamusisi forests, the three stations of investigation, the vegetations have high proportion of trees morphological types. This brings vulnerability to these ecosystems due to high intensity of human disturbance attracted by timber and charcoal extraction. Exploitation of non-timber forest products, particularly fruits and seeds as a source of edible oil can help to reduce oil costs by diversifying the resources in this commodity. This form of exploitation is more sustainable than timber extraction, because this is often viewed as a means of sustainable forest management affecting the structure and function of forests much less than other uses. Demonstration of tangible economic values can lay the foundation for rational use and protection of plant resources, because people tend to conserve plants which they know are important for their needs. Thus, Chemical evaluation of oils from some selected wild oilseed can establish these plants as source oil for various uses and of some important products such as provitaminic nutrients.

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