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Floristic diversity in most dry and environmentally disturbed areas of Northern Togo

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***Abstract*—The 170 relevés, out of a field sampling conducted in protected areas of Northern Togo, were subjected to a floristic analysis in order to study the status of the remnant flora and plant diversity and to determine the distribution of life forms and phytogeographic types. 274 plants species, grouped in 63 families were recorded, among which six families proved to be well represented in this region. The Sudano-Zambesian species followed by Pan-Tropical and Guineo-Congolian were themost frequent phytogeographic types while the phanerophytes, especially micro-phanerophytes and nano-*phanerophytes*, were the most represented life forms.**

Keywords-Diversity, life form, phytogeographic, protected areas, Togo

I . INTRODUCTION

By ratifying all the agreements of the UN-sponsored International Conferences on biodiversity, in particular that of Rio in 1992, Togo has recognized the sustainable management of the protected areas as an economic, social and especially eco-environmental issue. However, the sustainable management of these areas requires a systematic knowledge of the available flora and fauna resources as well as the major disturbance factors they are confronted with. Among the 43 ecosystems retained out of the 83 proposed for the project of consensual rehabilitation of the protected areas, only few of them was subjected to preliminary studies on the available resources [12]. The situation is far more alarming in northern Togo where only one out of 6 protected areas have been subjected to scientific research.

The acute lack of primary data on biodiversity, the absence or the insufficiency in the monitoring of the disturbance factors (bush fires, hunting, logging, grazing, transhumance, poaching) in this area of the Togo, which has a higher rate of protected areas compared to the other areas, is a handicap to the long-awaited sustainable management of these ecosystems and their surroundings.

This article attempts to explore the phytogenetic resources of Northern Togo. It aims to present and describe the vegetation of this dry climate area in terms of floristic, phytogeographical and life form types.

II. STUDY AREA

The zone of study is situated in the ecological field 1 [5] and covers the protected areas of Galangashi-Barkossi complex and Oti-Keran, ecosystems which were gazetted as protected areas in 1954 and 1971, respectively (Figure 1).

The region is characterized either by a Sudanese tropical climate marked, with the alternation (Figure 2) between long dry and short rainy seasons [13].

The adopted sampling technique was based on the phytosociological concept of Braun-Blanquet [2]. Quadrats of 30 m×30 m were placed at every 100m along predefined transect lines. However, the linear structure of plant formations along the rivers led us to opt for more stretched plots of 50m × 10 [8] in order to take into account more diversity.

For each sample, the species met were recorded and identified following Hutchinson and Dalziel [6]. All species were assigned a coefficient of abundance / dominance as suggested by Braun-Blanquet [2].

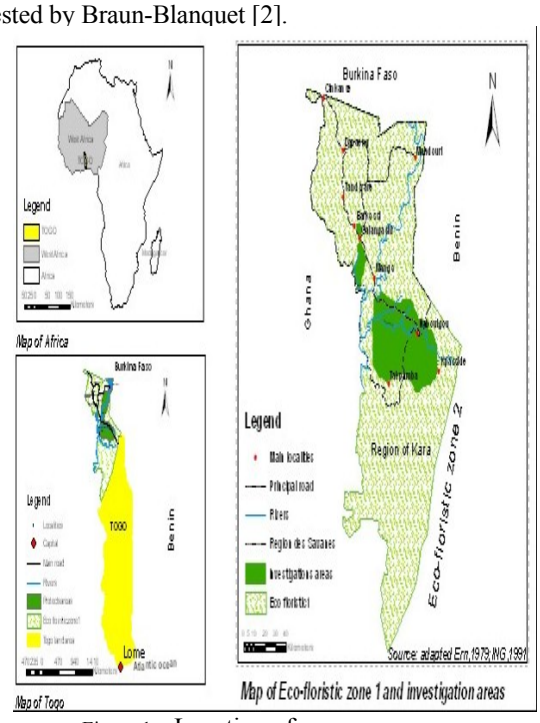

Figure 1. Location of survey areas

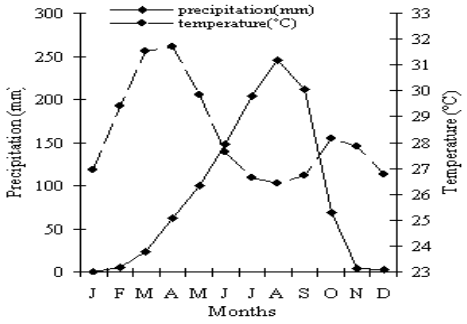

Figure 2. Climographs of the main meteorological station around the study area

III MATERIALS AND METHODS

The investigation ended, for a given sample, by its ecological characterization. In that regard, edaphic (structure and texture of soil), topographic (plateau, slope, versant, valley and bank) and disturbance variables (bush fires, hunting, logging, grazing, transhumance, poaching) were qualitatively noted without taking geographical coordinates.

The data processing for the 170 samples was digital and purely floristic after which the overall list of plants species was established. On the basis of the reference documents, mainly Hutchinson and Dalziel [6] and Aubreville [1] species were classified according to their phytogeographical types. Then, based on Raunkier's work [10], they were classified according to their life forms and biological types.

IV RESULTS

1. 274 plant species, grouped into 247 genera and 63 families, have been identified during this investigation.
2. Six families are represented by at least 10 species: Fabaceae (36 sp), Poaceae (28 sp), Combretaceae (18 sp), Rubiaceae (13 sp), Caesalpiniaceae (11 sp), Mimosaceae (11 sp) and Euphorbiaceae (10 sp). The third of families consists of one species each (Figure 3).
3. For all plant species recorded. One is new to Togo flora. This new specie concern Strelizia reginae Banks ex Aiton which was introduced in Togo.
4. Terminalia laxiflora, Crotalaria graminicola, Vitellaria paradoxa and Acacia polyacantha are both the most frequent and the most abundant species in the landscapes (Figure 4).
5. The Sudano-zambesian species (23.35%) followed by Pan-Tropical (16.78%), Guineo-Congolian (15.32%), and Sudano-Guinean types (11.67%) abound in the region (Figure 5).
6. Micro-phanerophytes (19.85%), nano-phanerophytes (17.27%) and therophytes (15.07%) are the predominant life forms (Figure 6).

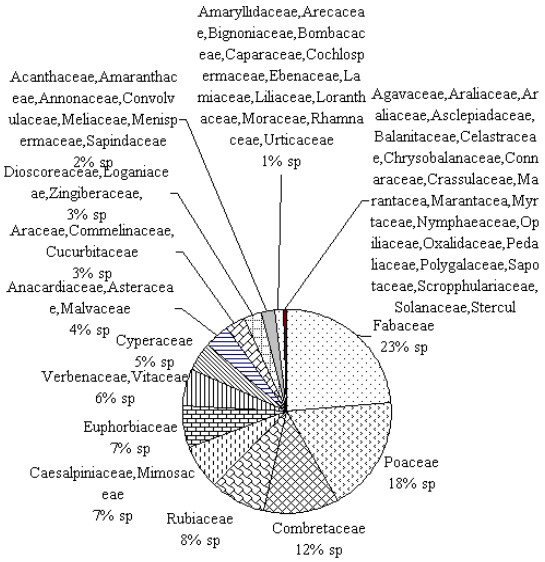

Figure 3. Distribution of species per families

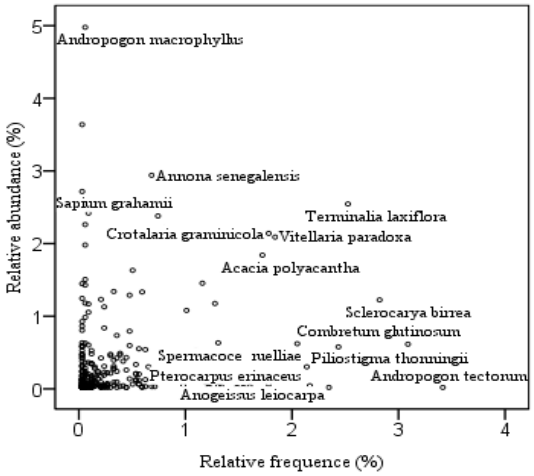

Figure 4. Curve of species frequencies and abundance distribution

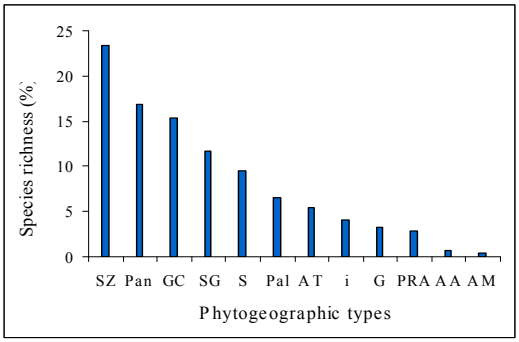

Figure 5. Phytogeographic types frequency distributionin the three protected areas.(SZ :Sudano-zambesian, Pan :Pan-Tropical, GC :Guineo-Congolian, SG :Sudano-Guinean, S :Sudanian, Pal :Paleo-Tropical, AT : Afro-Tropical, i: undefined, G: Guinean , PRA : Pluri Regional in Africa, AA: Afro-American, AM :Afro-Malgash)

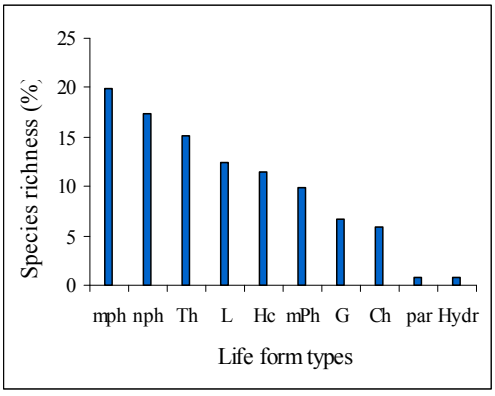

Figure 6. Life forms type frequencydistribution in the three protected areas (mph: micro-phanerophytes, nph: nano-phanerophytes, Th: Therophytes, L: Lianas, Hc: Hemicryptophytes, mPh: meso-phanerophytes, G: Geophytes, CH: Chamephytes, par: Parasite and Hydr: Hydrophytes).

V DISCUSSION AND CONCLUSION

Through this floristic investigation a total of 274 plant species were identified for the three protected areas, which represented the double of species recorded by Dimombe [4] in the fauna reserve of Oti-Mandouri in the same region. This major difference could be explained by the seasonal variations as the first was carried out in the rainy season while the later was conducted in the dry season. Smaller than that found in the sacred forests of Ouatchi area in the southeast of Togo by Kokou et al [7],the number of listed species is twice lower than that of those recorded, on the one hand, in the Fazao-Malfakassa national park and the fauna reserve of Aledjo (central part of the chain of Atakora) (617 species) by Woegan [12] and, on the other hand, in the septentrional part of the same chain(Benin) (663 species) by Wala [11].This wide variation might have been due to a climatic determinism. Although more species were identified in Niangoloko forest (Burkina Faso) [9] than in this study, Fabaceae and Poaceae are the most represented families in these two areas. These two families aside, Rubiaceae and Combretaceae are also well represented in the studies of the above-mentioned authors.

The phytogeographical types and life forms are strongly similar to those found by Dimombe [4] and Ouoba [9] where the predominance of Sudano-zambesian species and the micro-phanerophytes was observed, well in line with the dry nature of the climate. The high rate of phanerophytes illustrates the wooded nature of the region [11] while the 12.50% of lianas species in this dry area can indicate the level of reconstitution of wooded formations [8].The presence of the Guineo-Congolian species is due to the hydrographic network favorable to the development of a relatively more hygrophilous flora, while the presence of Pan-Tropical and Pluri Regional in Africa species shows the level anthropogenic pressure [4].The rate of undefined phytogeographic (4.01%) type can emphasized also the level of disturbances.

A study on the plant communities and the quantification of disturbances factors is necessary to lay out a synoptic view of the vegetation of this area.

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