



UNIVERSITY OF PARAKOU
FACULTY OF AGRONOMY

**LABORATORY OF STUDIES AND FORESTRY
RESEARCH (LERF)**

SCIENTIFIC REPORT

FROM 2014-2017

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1- Presentation of LERF

The Laboratory of Studies and Forestry Research (LERF), University of Parakou is the first specialized laboratory created at University of Parakou since 2003 by Late Professor Nestor SOKPON.

Like all academic institutions, LERF has three missions: training, research and service to third parties. The laboratory is nowadays structured into two research units which are:

- "Silviculture, Forest Ecology and tree species Conservation" Unit

- "Environnemetry - Geomatics & Applied Remote Sensing" Unit

The research works carried out in this laboratory generally deal with sustainable management of natural resources in sub-Saharan Africa. The research out put is regularly published in international peer reviewed journals as well as dissertations and theses.

1.1- "Silviculture, Forest Ecology and tree species Conservation" Unit

1.1.1- Research and training activities

The Unit for Silviculture-Forest Ecology and Conservation of Threatened Species is one of the units under the supervision of the Laboratory of Studies and Forestry Research (LERF), which is involved in the research and training of managers in the field of forestry development and management of natural resources. Several fields are covered but the most important are: Population and species ecology Non-timber forest products, agroforestry diversity and genetic improvement, peasant forestry and agrarian systems. This unit contributes to the training of students for the Professional Degree, the Professional Master, the Research Master and the Doctoral Thesis. The research unit also contributes to the animation of community life by taking into account the concerns of the communes through the research work of the students.

1.1.2- Collaboration and Networking

To achieve its research and training objectives, the Silviculture-Forest Ecology and Conservation of threatened species unit has forged scientific collaborations with other laboratories and research centers at national level (Laboratory of Genetics and Biotechnology, University of Abomey-Calavi, Laboratory of Pharmacognosy and Essential Oils of CBRST Porto-Novo / Benin), Subregional (Forestry Research Institute of Ghana, FORIG, New Bussa Forestry Research Institute of Nigeria) and CEF-Laval / Department of woods sciences and forest of Laval University / Canada.

1.2- "Environnometry - Geomatics & Applied Remote Sensing" Unit

1.2.1- Research and training activities

The research activities of this unit are carried out under the supervision of the Laboratory of Studies and Forestry Research (LERF) and meet the needs of initial training and continuing education in the fields of forestry, geomatics applied to agriculture and the environment, photogrammetry, remote sensing and digital image processing, and is complementary to the research activities of the Unit "Forestry - Forest Genetics & Conservation of Threatened Species". The "Environnometry - Geomatics & Applied Remote Sensing" unit focuses these research activities mainly on environmental analyzes, starting from a set of computerized equipment facilitating sampling, positioning of the surveys and analysis on the ground. We use standardized analytical protocols to characterize the biophysical and chemical properties of soils, water and vegetation in the environmental dynamics that shape them. These quantitative measurements make it possible to validate the data taken with telemetric instruments. Our research also makes it possible to consider decision-making tools in the field of natural and rural heritage management.

In addition, the "Environnometry - Geomatics & Applied Remote Sensing" unit is available to researchers and graduate students (Masters Professionals, Research Masters and PhD students) who use Remote Sensing and GIS as part of their research. Students at the License level have access to them when the use of photo-interpretation for ecosystem mapping is required.

As an outlook, the " Environnometry - Geomatics & Applied Remote Sensing" proposes a catalog of short - term and continuing training courses, the main objective of which is to answer the topical questions that can be asked by those responsible for the " Technical directors, rural development officers and their collaborators, foresters and a wider audience such as planning and design offices, urban planners and professionals in the fields of cartography, Geographical information, land and agricultural land registers. The ESGT can also set up tailor-made training courses to meet specific needs. The training program is then jointly established between the organization and the school.

1.2.2- Collaboration and Networking

In order to fulfill its mission of service to society, the LERF animation teams work actively with local, regional, national and international players. Concretely, the "Environnometry - Geomatics & Applied Remote Sensing" Unit intends to propose a catalog of short - term and continuing training courses, the main objective of which is to answer the topical questions posed by those in charge of the " Technical directors, rural development officials and their collaborators, foresters and a wider audience such as research”.

2- Different activities in LERF and main results

2.1- Research axis

During the past three years, our research focuses on six (6) axis, most of which are in sub-axis as follows:

Axis 1: Silviculture and domestication of threatened forest species and species with high socio-economic and cultural potentialities (Vegetative and generative multiplication)

Axis 2: Ethnobotany and demographic study of forest species

- Sub-axis 1: Ethnobotany and valorization of forest species
- Sub-axis 2: Demographic Status and Dendrometric Structure of Species

Axis 3: Morphological and genetic variability of threatened forest species

- Sub-axis 1: Morphological characterization of species in their habitat
- Sub-axis 2: Genetic characterization of species

Axis 4: Fragmentation of forest ecosystems, spatio-temporal dynamics and conservation of plant communities and endangered species

- Sub-axis 1: Ecosystem fragmentation and connectivity of sacred forests to existing natural forests
- Sub-axis 2: Spatio-temporal dynamics and conservation of plant communities and endangered species.

Axis 5: The contribution of geomatics tools to the improvement of agricultural statistics in Benin: Applications to food crops and cotton.

Axis 6: Analysis and management of climatic extremes in relation to spatial planning

2.2- The Main research out put

During the last three years, the scientific publications produced by LERF are listed below:

1. Wédjangnon A.A., Houèchégnon T. and Ouinsavi C. Ecological characterization and mass propagation of *Mansonia altissima* A. Chev. in the guinean zone of Benin, West Africa. Int. J. Pure App. Biosci. 4 (4) ISSN: 2320 – 7051 Impact factor: SJIF 5.358 (2015) GIF 0.654 <http://www.ijpab.com> indexed in COSMOS IMPACT FACTOR 15-25 2016
2. Wédjangnon A. A., Houèchégnon T., Ouinsavi C. Ethnobotanical characteristics and socio-cultural importance of *Mansonia altissima* A. Chev. in Benin, West Africa. Journal of Animal & Plant Sciences, 2016. Vol.29, Issue 3: <http://www.m.elewa.org/JAPS/index.html> ISSN 2071-7024, Indexed By : CABI Index Veterinarius; DOAJ 4678-4690 2016
3. Alohoun E. C., Ouinsavi C., and Sokpon N. Fragmentation des écosystèmes forestiers: définitions des concepts et évolution des méthodes d'évaluation International Journal of Innovation and Applied Studies Vol. 17 No. 2 Jul. ISSN: 2028-9324 <http://www.ijias.issr-journals.org> indexed in ResearchGate, Copernicus, DOAJ SJIF 2014: 3.89 GIF 0.786 474-486 2016

4. Alohoun E. C., Ouinsavi C., Sokpon N. Facteurs déterminants de la fragmentation du bloc forêt classée-forets sacrées au sud-Bénin *Journal of Applied Biosciences* 101. <http://www.m.elewa.org/Journals/about-jab/> ISSN 1997–5902 indexed by AGORA DOAJ Google scholar Metrics WORLDCAT CAB ABSTRACTS 9618 – 9633 2016
5. Sourou B., Yabi J., Ouinsavi C. et Sokpon N. Importance socio-économique de la prune rouge (*Haematostaphis barteri* Hook f.) Au Bénin. *Int. J. Biol. Chem. Sci.* 10(1). ISSN: 1991-8631 (print), ISSN: 1997-342X (online). IF= 0.31 <http://www.ajol.info/index.php/ijbcs> <http://www.crossref.org> <http://scholar.google.com> <http://www.journaltoacs.ac.uk> <http://www.researchgate.net/journal/1991-8631,326-343> 2016
6. Sourou N. B., Ouinsavi C. and Sokpon N. Ecological structure and fruit production of blood plum (*Haematostaphis barteri* Hook. F) Subpopulations in Benin. *International Journal of Plant & Soil Science* 9(2), ISSN: 2320-7035 Science (IF:31) <http://www.sciencedomain.org/> indexed in PubMed, ISI web of Science 1-12 2016
7. Alohoun E. C., Gbemavo D. S. J. C., Ouinsavi C. and Sokpon N. Local perceptions and importance of endogenous beliefs on sacred groves conservation in south Benin. *International Journal of Biodiversity and Conservation*, Vol. 8(5), Academic Journals, ISSN 2141-243X. <http://www.academicjournals.org/journal/IJBC> Google Scholar h5-index: 12 (AJOL), 105-112 2016
8. Boko-Haya Y.Y., Ouinsavi C., Houngbeme A., Gbaguidi G. Ethnic differences in use, phytochemical screening and non-poisonous leaves of *Phyllanthus amarus* (Schum & Thonn.) in northern Benin. *The Journal of Ethnobiology and Traditional Medicine*. Photon 126, ISJN: 6642-3194: Impact Index: 6.38, Photon Foundation 1185-1196 2016
9. De LONGUEVILLE F, HOUNTONDJI YC, OZER P, HENRY S Long-term analysis of rainfall and temperature data in Burkina Faso (1950-2013). *Int. J. Climatol.* (36) [Impact Factor (2015): 3.609; ISI Journal Citation Reports © Online ISSN: 1097-0088] 4393–4405 2016

10. Houëtchégnon T., Gbèmavo C., Ouinsavi C., Sokpon N. Ethnobotanical knowledge and traditional management of african mesquite (*Prosopis africana* Guill., Perrot. et Rich.) Populations in Benin, West Africa. The Journal of Ethnobiology and Traditional Medicine. Photon 125, ISJN: 6642-3194: Impact Index: 6.38, Photon Foundation 1124-1135 2015
11. Dadegnon S., Gbemavo C., Ouinsavi C. and Sokpon N. Morphological variation and ecological structure of *Chrysophyllum albidum* G. Don International Journal of Plant & Soil Science 5(1), ISSN: 2320-7035 <http://www.sciencedomain.org/> indexed in PubMed, ISI web of Science 25-39 2015
12. Houëtchégnon T., Gbèmavo D. S. J. C., Ouinsavi C., Sokpon N. Morphological variability of *Prosopis africana* (Guill., Perrott. et Rich.) Taub in Benin, West Africa. American Journal of Plant Sciences, 2015, 6. ISSN Print: 2158-2742, ISSN Online: 2158-2750. <http://www.scirp.org/journal/ajps>. Google-based Journal Impact Factor (2-GJIF) = 1.10. 1069-1079 2015
13. Houëtchégnon T., Gbèmavo C., Ouinsavi C., Sokpon N. Structural characterization of *Prosopis africana* populations (Guill., Perrott., and Rich.) Taub in Benin. International Journal of Forestry Research Volume 2015, Article ID 101373, 9 pages. <https://www.hindawi.com/journals/ijfr/ai/5902> indexed by AGORA DOAJ Google scholar, Scopus, CAB ABSTRACTS, OARE, environment index, Forest Science Database 9 pages 2015
14. Houevoganwa M.C., Ouinsavi C., Goudegnon E., Gbemavo C., Sokpon N. et Akpona S. Dynamique spatio-temporelle de la végétation et des simules vecteurs de l'onchocercose cécitante au Bénin Int. J. Biol. Chem. Sci. 8(4), ISSN: 1991-8631 (print), ISSN: 1997-342X (online) IF= 0.31. <http://www.ajol.info/index.php/ijbcs>, <http://www.crossref.org> <http://scholar.google.com> <http://www.journaltoes.ac.uk> <http://www.researchgate.net/journal/1991-8631> 1669-1683 2014

15. Isidore Yolou, Fulgence Afouda, Euloge Ogouwale, Nourou S. Yorou, Jacob A. Yabi, Christine Ouinsavi, Nestor Sokpon Essai de décomposition expérimentale des déchets organiques en substances nutritives. Rev. Sc. Env. Univ., Lomé (Togo), 2014, n° 11 161-180 2014.
16. De LONGUEVILLE F, HOUNTONDJI Y-C, OZER P, HENRY S. The Air Quality in African Rural Environments. Preliminary Implications for Health: The Case of Respiratory Disease in the Northern Benin. Water, Air, & Soil Pollution, 225 (11) [Impact Factor (2015): 1.551, JCR- (Thomson Reuters) (Print)-ISSN: 0049-6979, (Online) ISSN: 1573-2932] 1-13 2014

Communications in edited proceedings

17. GNONLONFIN, LAURENT, OUINSAVI, CHRISTINE, OUMOROU, MADJIDOU, 2015: Local knowledge, patterns and ethnic differences in use values of *Diospyros mespiliformis* in Northern Benin. In: Actes du 2^e colloque de l'Université de Parakou, Atelier 2, Sciences Exactes, Naturelles, Agronomiques, Biologiques et Développement Local. p. 12-30. ISBN/ISSN : 678-99919-62-55-9.
18. OZER P, HOUNTONDJI Y-C, GASSANI J., DJABY B, DE LONGUEVILLE F. (2014) Évolution récente des extrêmes pluviométriques en Mauritanie (1933-2010), In : Actes du 27e Colloque de l'Association Internationale de Climatologie, «CLIMAT : SYSTÈME & INTERACTIONS», 2-5 juillet 2014 – Dijon (France), Pierre CAMBERLIN & Yves RICHARD, (Eds.), pp: 394-400.
19. AHOUCHE MBD, DJABY B, HOUNTONDJI Y-C, THIRY A, DE LONGUEVILLE F, P. OZER, (2014). Adaptation et résilience des populations rurales face aux catastrophes naturelles en Afrique subsaharienne. Cas des inondations de 2010 dans la commune de Zagnanado, Bénin. In : actes du Colloque international en hommage à Gérard MOGUEDET, «Eau, milieux et aménagement. Une recherche au service des territoires», A. Ballouche & N.A. Taïbi (Eds.), Presses de l'Université d'Angers 2014, Angers (France), pp : 265-278.

3- Abstracts of publications, thesis and dissertations

3.1- Abstracts of Publications

Ecological Characterization and Mass propagation of *Mansonia altissima* A. Chev. in the Guinean Zone of Benin, West Africa.

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Int. J. Pure App. Biosci. **4(4)**: 15-25 (2016). doi:

<http://dx.doi.org/10.18782/2320-7051.2339>

ABSTRACT

The ecological characteristics of *M. altissima* in Benin were studied within the sacred groves of Adakplamè, its exclusive environment in Benin. The data collected in 40 rectangular plots of 1000 m² sized showed that *M. altissima* is more preferred species in this environment (Ri = 37.5%). Variables such as tree density, stand basal area, and mean diameter of tree were respectively 20 stems/ha, 0.88 m²/ha and 23.91 cm. Weibull 3-parameters distribution showed an « inverted J » shape with the predominance of medium class-sized individuals (DBH=15 cm). Germination test showed that *M. altissima* seeds were affected by a tegumentary dormancy making the germination rate decrease after a long conservation. Soaking of seeds in boiling water was an appropriate treatment to overcome this dormancy and to reduce the latency time and the average duration of germination. This also speed up seeds germination and allowed the highest germination rates. Mass propagation by cuttings showed a weak performance of regeneration. Naphthalene Acetic Acid (NAA) and cuttings diameter showed no significant effect on the regeneration of *M. altissima* cuttings.

Keywords: ecological characterization, vegetative propagation, *M. altissima*, Benin

Ethnobotanical characteristics and socio-cultural importance of *Mansonia altissima* A. Chev. in Benin, West Africa.

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Journal of Animal & Plant Sciences, 2016. Vol.29, Issue 3: 4678-4690.

<http://m.elewa.org/Journals/wp-content/uploads/2016/07/4.Wedjangnon.pdf>

ABSTRACT

This study aimed at identifying endogenous uses of *M. altissima* and determining its sociocultural importance. We interviewed a number of 90 persons (30/ethnic group) belonging to three (03) ethnic groups. Results showed a low diversity (ID=1.96) and equitability (IE=0.30) translating unequal distribution of knowledge between persons interviewed. Considering the gender, old adult men had more knowledge (ID = 0.53 and IE = 0.11) on *M. altissima*. Among women, only adults had more knowledge (ID=0.47 and IE=0.11) on *M. altissima*. Organs used differed between ethnic groups and genders. The majority of men belonging to Mahi ethnic group were involved in wood utilization while women were involved in the leaves one. Both genders used barks commonly to treat children fever during set of teeth and leprosy. Barks are also used as invigorators. Woods are more (VUT=10.05) used than leaves (VUT=2.35) and barks (VUT=1.75).

Keywords: Ethnobotany, importance, *M. altissima*, Benin.

Determinant factors of forests' fragmentation: a case study of the sacred forests in South Benin.

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Journal of Applied Biosciences 101:9618 – 9633.

ABSTRACT

Objective: The current study aimed at (1) identifying vegetation groups at origin of sacred groves creation using Juhe-Beaulaton (2006) approach (2) describe sacred groves creation periods and (3) analyze factors expressing their dynamic.

Methodology and results: While current body of knowledge on forest fragmentation come from botanical, palynological and archaeological studies, this study seeks to identify from perceptions of riverine people of sacred groves, factors responsible of forest block fragmentation in order to propose their sustainable management and reclamation taking into account cultural considerations. Group and individual interviews were done with 120 old people. Data was collected on riverine to sacred groves documentation, their origin, period and reason of making them sacred groves, management practices, perceptions on forest decline and underlying causes and factors that have allowed conservation of persistent sacred groves. Results showed that most of the sacred groves originated from pre-existing large forests, trees made sacred or from historical sites. Their “consecration” took place at same time with human settlement in forest areas, especially before and in the colonial period. The “consecration” of the forests reinforced its conservation but did not prevent the regression of the area of almost all the sacred groves. In addition, colonization, political orientation of Benin and population growth appeared as factors with predominant and additive effects on forest regression, even after they had been made sacred.

Conclusion and application of results : Even if “consecration” of forest relic is often recognized as an endogenous solution to safeguard forest resources, the maintenance of social order along with endogenous values that sustain management of forest is necessary for persistent beneficial from those forests. That is why, the conservation strategy and sustainable use of sacred groves must be inclusive at the local level with a strengthening of traditional authority in the management and allocation of the sacred groves, a legal- technical management tools.

Keywords: forest fragmentation, determinants, local perceptions, endogenous values.

Local perceptions and importance of endogenous beliefs on sacred groves conservation in South Benin.

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International Journal of Biodiversity and Conservation; Vol. 8(5), pp. 105-112, May 2016. DOI: 10.5897/IJBC2015.0918. Article Number: 91DFE8158492

ABSTRACT

Turning forests into sacred groves remains an effective strategy as far as conservation of forests is concerned. Nowadays sacred groves are eroded to a wide range of adversities. In this paper, the authors analyzed (i) perception of population on sacred groves dynamic and (ii) the effect of modern religion expansion on sacred groves conservation. To these end, data were collected using individual interviews on 458 informants sampled in six localities surrounding sacred groves. A Chi-square independence test, analytic comparison of means and principal component analysis were applied for data analysis. Findings showed that the sacred grove areas have decreased by more than half during the last three decades (78.06% of interviewees). Categories of sacred forests that are religious groves were the most threatened (70.30% of interviewees). Twenty plants species belonging to 13 botanic families were identified as symbolic species in the sacred groves, *Milicia excelsa* and *Triplochiton scleroxylon* being the most common species. Sacred groves provide a wide range of services among which cultural service was found to be the most preferred by the local population (76.90% of citation). Religious groves and secret forests were found to be the ones providing the most diversified services. However, religious beliefs did not affect the use of sacred groves. The reinforcement of the conversion of forests into sacred groves by the introduction of the secret societies could be efficient towards conservation.

Nevertheless, there is a need to identify biological factors which can indicate possibility of species extinction so as to ensure restoration of sacred groves.

Keywords: Local perception, conservation, restoration, sacred groves, symbolic species, Benin.

Fragmentation of forest ecosystems: Definitions of concepts and evolution of assessment methods.

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International Journal of Innovation and Applied Studies ISSN 2028-9324 Vol. 17 No. 2 Jul. 2016, pp. 474-486

ABSTRACT

This article appears as a review on habitats fragmentation. It clarified key concepts related to fragmentation and summarized methods and tools used for assessing fragmentation. Results revealed that fragmentation understanding was perceived at different ways. However, there is an intersection between all definitions we met in the literature. Fragmentation is commonly known as the filtering of a given habitat, its size, shape and the spatial distribution of its components. At forest level, fragmentation was known to limit fauna and flora needs due to the habitat's components migration and dispersion and hence induce biological and ecological erosion. Two approaches are commonly used in evaluating fragmentation of habitats. These include spatial and functional approach and spatial and statistical approach. Spatial and functional approach requires photo-interpretation analysis and socio-linguistic investigations. Such approach is based on models such as tasks-corridor/matrix models, grids-based models and index-based models. Spatial and statistical approach is based on autocorrelation models that globally includes semi-variogram and autocorrelation spatial index. The literature revealed that habitats fragmentation has recently been addressed in West Africa. Although acceptable efforts have concerned this environmental issue, there is a need to elucidate some unaddressed aspects in order to get deepened comprehension of fragmentation and its effects on natural resources and human being.

We suggest the combination of both above mentioned approaches when studying fragmentation of sacred groves and forest reserves in a participatory way.

Keywords: Ecology, Fragmentation, Landscape, Function, spatial index.

Socio-economic importance of Blood plum (*Haematostaphis barteri* Hook F.) in Benin.

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Int. J. Biol. Chem. Sci. 10(1): 326-343, February 2016

ABSTRACT

The socioeconomic importance of *H. barteri* has been studied in North West Benin on the basis of ethnobotanical and socioeconomic investigations respectively administered to 230 and 100 people of both sexes and randomly selected from the three majority sociocultural groups of study area namely Waaba, Bêtammaribé and Natimba. The COBB-DOUGLAS model has been used to assess the determinants of annual net profit obtained from the sale of *H. barteri* fruits. The study shows that the main organs of the species namely the leaves, roots and barks are used in the treatment of many diseases while fruits are mainly used as food. These different uses of *H. barteri* vary from one ethnic group to another. The average annual income obtained from the sale of *H. barteri* fruits is low (10 077 FCFA) and is significantly ($P < 0.001$) influenced by the total workforce and the amount of total capital used. *In situ* conservation of *H. barteri* trees and the valorization of its fruits through their transformation could contribute to the future preservation of the species.

Keywords: Benin, conservation, ethnobotany, *Haematostaphis barteri*, economic profitability.

Ethnic differences in use, phytochemical screening and non-poisonous leaves of *Phyllanthus amarus* (Schum & Thonn.) in North of Benin.

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The Journal of Ethnobiology and Traditional Medicine. Photon 126 (2016) 1185-1196

ABSTRACT

This study was to evaluate the traditional medicinal use of *Phyllanthus amarus* in Northern of Benin among three majority ethnic groups and process to phytochemical and toxicological analyses of leaves from three provenances.

A semi structured questionnaire was addressed to the questioned people. Accompanied with a translator, the questions are individuals after having presented if necessary a sample of the species. Collected data are ethnobotanical regarding inner knowledge of different sociocultural groups of the study zone on what they use *Phyllanthus amarus* organs for. Ethnobotanical surveys reveal that the IE values indicate the knowledge about *Phyllanthus amarus* are distributed in a uniform way among Bariba and Otamari. Peulh use *Phyllanthus amarus* for its food and veterinary properties, the Bariba for esoteric and fertilizing properties and the Otamari for its medicinal properties. The watery extract of *Phyllanthus amarus* leaves contains big families of chemical groups (alkaloids, tannins, anthocyanin, mucilage, heterosids, etc.) whose number and nature vary according ecological stations. As far as the toxicity study based on larvas survival is concerned, the watery and ethanolic extract of the leaves present a LC₅₀ superior to 0.1 mg/ml no matter what the provenance of the plant is, they are non-toxic on the human cells.

Keywords: Ethnobotanical, phytochemical screening, toxicity, *Phyllanthus amarus*, North of Benin.

Ecological Structure and Fruit Production of Blood Plum (*Haematostaphis barteri* Hook. F) Subpopulations in Benin.

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International Journal of Plant & Soil Science 9(2): 1-12, 2016; Article no.IJPSS.22059

ABSTRACT

Aims 1: To assess the ecological structure and fruits production of *Haematostaphis barteri* (Bloodplum) to provide requisite information for a better management and conservation of the tree subpopulations in Benin.

Study Design: Ecological structure and fruit production were evaluated in randomized design.

Duration of Study: This study was conducted in the department of Atacora and University of Parakou, Benin 2012-2015.

Methodology: The ecological structure of *Haematostaphis barteri* subpopulations was studied on the basis of forest inventory surveys performed in forty six (46)/ha plots randomly installed and *Haematostaphis barteri* fruit production was quantified on the basis of a random sampling of the main branches of 126 trees at random from all of these subpopulations.

Results: Four subpopulations of *Haematostaphis barteri* were identified based on dendrometric variables and among trees distance. Diameter and height classes distribution of the species in each subpopulation adjusted to Weibull distribution showed a bell shaped curve with left dissymmetry, characteristic of young stands (form coefficient between 1 and 3.6). Stand density varies from 12 to 18 stems/ha. Stand basal area varies from 0.27 to 0.48 m²/ha while mean diameter varies from 16.28 to 19.37 cm. Average number of fruit per panicle varies from 15 to 28 fruits and average fruit number per tree was estimated from 2325 to 7879 fruits. The DBH, Total height, average number of panicles per branch and average number of fruit per panicle showed a highly significant difference ($P = .000$) between subpopulations.

Conclusion: Soil texture, altitude and topography are the factors that best discriminate the different subpopulations and better explain variations among these subpopulations with respect to their structural and production characteristics. Despite the similar production in fruits of *Haematostaphis barteri* subpopulations that of Touncountouna is however the most productive in terms of the number of fruits.

Keywords: Ecological structure; blood plum; fruits production; subpopulation; Benin.

Long-term analysis of rainfall and temperature data in Burkina Faso (1950–2013).

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ABSTRACT

In this study, trends of classic climate indices on temperature and rainfall were combined with analyses of seasonal indices in order to better highlight the different angles of climate variability and change observed since 1950 in Burkina Faso. Results show that there is no doubt global warming affects all regions of the country. Concerning rainfall, the decrease of total annual precipitation proves to be the most significant change. This is consistent with results of other studies that focused on other areas of the sub-region. Despite this negative trend in all stations, this study demonstrates that the majority of stations have recorded a rainfall recovery in recent years.

However, the rainfall levels recorded in 2013 are still far from what they were before the great droughts. The investigation of extreme events shows an overall stability in the frequency and in the intensity of these events. However, the conjunction of the general decrease of total rainfall, of the increase of average rainfall for wet days, of the increase of maximum consecutive dry days and of the decrease of maximum consecutive wet days proves that, even if there is not an increase in so-called heavy rains, there are changes in the pattern of rainfall. Because the results do not show a significant increase of extreme events, it is likely that the socioeconomic impacts generally presented as direct consequences of climate change and which are increasingly observed affecting inhabitants of Burkina Faso cannot be attributed to climate change alone.

Keywords : Burkina Faso; climate change; long-term trends; rainfall; temperature

Morphological Variation and Ecological Structure of *Chrysophyllum albidum* G. Don

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International Journal of Plant & Soil Science 5(1): 25-39, 2015; Article no.IJPSS.2015.057

ABSTRACT

Chrysophyllum albidum is a tropical forest species which plays tremendous socioeconomic role in west Africa because of its fruits large consumption and trade. Morphological variation and ecological structure of *Chrysophyllum albidum* G. Don were assessed in Benin in order to contribute to the species domestication. Dendrometric parameters such as diameter at breast height, total height, and bole height were measured from 120 individual trees across two ecological zones and four different provenances. In addition, morphometric parameter related to fruits and seeds such as fruit length, fruit width, fruit weight, seed length, seed width and seed weight were measured for 1,800 fruits and 1,800 seeds. Principal component analysis was performed on the untransformed morphometric data using the correlation matrix.

Diameter and height classes' distribution of *C. albidum* in each ecological zone adjusted to Weibull distribution showed a bell shaped curve with left dissymmetry, characteristic of young stands (form coefficient between 1 and 3.6). From principal component analysis, no differentiation was observed, indicating that accessions from different agroecological zones were similar morphologically. However analysis of variance performed separately on morphometric data revealed some significant difference among agroecological zones and among provenances as far as bole height ($P= .000$) and fruits and seeds size ($P= .021$) are concerned. Although morphological variability in *C. albidum* between provenances and between agroecological zones is low there is path ways for selection purposes since bole height as well as fruits and seed weight exhibited large morphological variability among agro-ecological zones.

Keywords: Variability; morphology; *Chrysophyllum albidum*; Benin.

Ethnobotanical knowledge and traditional management of african mesquite (*Prosopis africana* Guill., Perrot. et Rich.) populations in Benin, West Africa.

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The Journal of Ethnobiology and Traditional Medicine. Photon 125 (2015) 1124-1135

ABSTRACT

Ethnobotanical knowledge of science *Prosopis africana* are very few or nonexistent in Benin in West Africa. Ethnobotanical knowledge of this indigenous species have been studied based on survey administered to 960 people. The collected data related to the use and management of the species based on different major socio-cultural groups of Benin, taking into account differences gender and ages. Ethnobotanical clues namely total diversity Index (ID), total Fairness Index (EI) and Virtues Index related bodies (IVO) were calculated and interpreted.

The Principal Component Analysis (PCA) was used to relate the age-gender categories and uses values of *P. africana* one hand, socio-linguistic differences and use of values of *P. africana* on the other hand. *P. africana* is solicited food perspective, craft, cultural, phytosanitary inspection, magical and medicinal therapist and above. All his organs are used by local people. Knowledge about these of *P. africana* are not well distributed among these respondents. They vary significantly according to age and sex categories and sociolinguistic groups ($P < 0.01$) of the respondents. Despite the importance of the species very little conservation practices are observed in local populations. It is under pressure and making it vulnerable in its natural habitat.

Keywords: Ethnobotanical knowledge, Management, vulnerability, *P. africana*, Benin, West Africa.

Structural Characterization of *Prosopis africana* Populations (Guill., Perrott., and Rich.) Taub in Benin.

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ABSTRACT

The structural characterization of *Prosopis africana* of Benin was studied on the basis of forest inventory conducted in three different vegetation types (savannah, fallow, and field) and three climate zones. The data collected in 139 plots of 1000 m² each related to the diameter at breast (1.3 m above ground), total height, identification, and measurement of DBH related *P. africana* species height. Tree-ring parameters such as Blackman and Green indices, basal area, average diameter, height of Lorey, and density were calculated and interpreted.

Dendrometric settings of vegetation type and climate zone (Guinea, Sudan-Guinea, and Sudan) were compared through analysis of variance (ANOVA). There is a significant difference in dendrometric settings according to the type of vegetation and climate zone. Basal area, density, and average diameter are, respectively, 4.47m²/ha, 34.95 stems/ha, and 37.02 cm in the fields; 3.01m²/ha, 34.74 stems/ha, and 33.66 cm in fallows; 3.31m²/ha, 52.39 stems/ha, and 29.61 cm in the savannahs. The diameter distribution and height observed at the theoretical Weibull distribution show that the diameter and height of the populations of the species are present in all positively skewed distributions or asymmetric left, a characteristic of single-species stands with predominance of young individuals or small diameters or heights.

Keywords: *Prosopis africana*, structural characterization, climatic zones, Benin, West Africa.

Morphological Variability of *Prosopis africana* (Guill., Perrott. Et Rich.) Taub in Benin, West Africa.

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<http://www.scirp.org/journal/ajpshttp://dx.doi.org/10.4236/ajps.2015.67111>

ABSTRACT

The morphological variability of *Prosopis africana* in its natural range (which includes three climate zones: Guinean zone, Sudano-Guinean zone and Sudanese zone) of Benin was studied on the basis of forest inventory carried out in three different vegetation types (savannah, fallow and field).

The data recorded in 139 plots of 1000 m² each related to the diameter at breast height (1.3 m over the ground level), the bole height, the height to the first branch, crown height, the crown diameter, number of branches on each individual tree. In these plots, 143 sheets were used to determine the length of leaf, the pinna length, leaflets' length, numbers of pinna, the number of leaflets, and the stalk diameter. In addition, 735 cloves were measured to determine the fruit pods' diameter, pod length, the total fruit weight and number of seeds per fruit, the seed length, the weight of a seed, and pulp weight. Analysis of variance components shows that the variability of *Prosopis* is generally greater among individuals than within vegetation types and climatic zones. Discriminant analysis showed that of the 19 morphometric characters seven (7) in the vegetation types and twelve (12) in climate zones revealed a statistically significant discriminating pattern r (prob. <0.0001). From ascending cluster of 481 *P. africana* trees measured, 10 morphogroups were depicted on the basis of 19 morphometric characteristics ($R^2 = 52.6\%$).

Keywords: Morphological Variability, Climate Zone, *Prosopis africana*, Benin, West Africa.

Spatio-temporal dynamic of vegetation and black flies, vectors of onchocerciasis blinding in Benin.

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ABSTRACT

The spatio-temporal dynamic of black flies, vectors of onchocerciasis blinding according to the vegetation dynamic, was studied in four bio-ecological localities of its range in Benin between 1990 and 2010. The results show that the number of black flies (*Simulium damnosum*) increased per region in time following the temporal decline of forest cover.

The savannah black flies carrying blinding larvae have increased in recent years in each region contrary to forest black flies with a particular accent in the Sudano-Guinean zone. The black flies nuisance and transmission of blinding onchocerciasis vary from region to region ($P < 0.001$). Areas of Sudano-Guinean zone are much more vulnerable to the resurgence of blinding onchocerciasis (high average PMT) compared with that of Guinean zone.

Keywords: Forest, savanna, black flies, environment, health, Benin.

Experimental decomposition of organic waste into nutrients.

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Rev. Sc. Env. Univ., Lomé (Togo), 2014, n° 11

ABSTRACT

The current study examines the process of decomposition of mineral elements and of mineralomass contained in organic waste. After twelve weeks' observation, in a complete hazardous block of appliance to a treatment repeated 12 times, the results revealed that animal garbage have the higher contents in calcium (29.98% of the dry material), in nitrogen (5.73% of the dry material), in sodium (2.2% of the dry material), in magnesium (1.03% of the dry material), and in phosphorus (0.85% of the dry material) than vegetable garbage. The latter are richer in potassium (5.05% of the dry material) comparatively to animal garbage. Iron is the more abundant oligoelement (6430 mg/kg of the dry material).

The other oligoelements (Mn, Cu and Zn) are clearly less abundant. The evaluation of the monthly restitution of the polyelements (N, P, K, Na, Mg, Ca) by organic garbage showed that the total mass of those minerals varies from one month to the other (5307 kg/ha in December 2011; 7246 kg/ha in January 2012 and 7665 kg/ha in February 2012).

Keywords: decomposition, mineralomass, organic waste.

The Air Quality in African Rural Environments. Preliminary Implications for Health: The Case of Respiratory Disease in the Northern Benin.

Florence De Longueville & Yvon Hountondji & Pierre Ozer & Sabine Henry

Water Air Soil Pollut (2014) 225:2186 DOI 10.1007/s11270-014-2186-4

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ABSTRACT

Recently, the World Health Organization's International Association for Research on Cancer classified outdoor air pollution as carcinogenic to humans and puts air pollution in the same category as tobacco smoke, UV radiation, and plutonium. The ambient air is polluted by emissions from motor vehicles, industrial processes, power generation, household combustion of solid fuel, and other sources. Dust storms lead to particulate levels that exceed internationally recommended levels, especially near the Sahara.

However, this source of air pollution appears to be under-studied, particularly in the literature devoted to human health impacts in West Africa. More than 50% of the total dust emitted into the atmosphere comes from the Sahara. These aerosols contribute to increase the concentrations of particles smaller than 10 μm (PM_{10}), which are breathable particles. This study is the first designed to assess the real impact of Saharan dust on air quality and respiratory health of children in a region of West Africa. Dust events having affected the Northern Benin during the dry seasons between 2003 and 2007 were determined. The analyzed health data are the monthly rates of acute lower respiratory infections (ALRI). Over the entire study period, 61 days of dust events were observed in the region. They recorded on average a daily PM_{10} concentration of $1017 \mu\text{g m}^{-3}$, more than 18 times higher than that calculated on all days without dust events. The study also highlighted a mean increase of 12.5% of ALRI rates during the months recording dust events. The use of daily health data should help to refine these initial results in the future.

Keywords: Acute lower respiratory infections, Dust, Benin, Children, Sahara

Recent trends in rainfall extremes in Mauritania (1933-2010).

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XXVIIe Colloque de l'Association Internationale de Climatologie 2-5 juillet 2014 – Dijon (France). pp394-400

ABSTRACT

A set of indicators was compiled to determine if the frequency and/or intensity of rainfall has changed significantly over the past decades in the Islamic Republic of Mauritania. This study is based on national indices based on daily precipitation series of nine synoptic stations covering the 1933-2010 period. The analysis of rainfall required to annually calculate thirteen precipitation indices: the yearly rainfall (PTOT), the total number of wet days (precipitation ≥ 1 mm, JP), the simple day intensity index (SDII), the maximum rainfall recorded over one day (Px1J), the frequency of rainfall events ≥ 10 mm (P10), ≥ 20 mm (P20), intense (P95) and extreme (P99). The relative weight of the last five indices in the total annual rainfall is also appreciated. The results show that PTOT, JP, P10 and P20 indices have a significant downward trend over the 1933-2010 period. At the same time, the frequency of intense and extreme precipitation is unchanged. De facto, the SDII increases significantly. These results are in line with the conclusions of the Intergovernmental Panel on Climate Change (IPCC) at the a global scale, i.e. extreme precipitation unchanged in a global desiccation context. According to many models, decreasing rainfall is likely in the coming decades. Therefore, cross-border adaptation strategies should be urgently considered as the process of global warming is not likely to decrease in the coming decades.

Keywords: Rainfall indices, extreme rainfall, adaptation, Mauritania.

Adaptation and resilience of rural populations to natural disasters in sub-Saharan Africa. Cases of the floods of 2010 in township of Zangnanado, Benin.

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Presses de l'Université d'Angers, 2014. Colloque international en hommage à Gérard Mogueuet. pp265-278

ABSTRACT

Benin, like most countries in sub-Saharan Africa, is subject to increasing rainfall variability resulting from climate change. In September 2010, the country experienced one of the most disastrous floods in its history, resulting in inestimable material damage and thousands of disaster victims. This study presents a participatory analysis of the local adaptation strategies and post-disaster resilience of the 2010 floods in the rural municipality of Zagnanado in order to reinforce and / or improve future strategies. The qualitative data were collected using semi-direct interviews with key actors in two of the villages most affected by the disaster: Kpoto and Agonvê. Individual questionnaires were also submitted to sixty inhabitants (heads of household) of these two villages. The disaster described the disaster as exceptional because of the surprise, the height of the water and the level of damage caused. On the socio-economic level, the damage caused by water impacts - in order of importance - the habitat, water, and agriculture and transport sectors. On the socio-demographic level, the floods caused temporary migration for the majority of the population and permanent displacements which affected about 50% of the youth population. Exogenous strategies are mostly in-kind and cash donations designed to help cushion the damage shock. Endogenous strategies range from changes in house building techniques to the development of alternative activities to agriculture, livestock and fisheries. Overall, most of the strategies adopted have no significant impact on future flood risk management.

Keywords: climate change, floods, vulnerability; Resilience; Adaptation strategies; Sub-Saharan Africa; Benin.

3.2- Abstracts PhD theses

HOUETCHEGNON Towanou. Ethnobotanical, Ecological and Morphological Studies of *Prosopis africana* (Guill., Perrott. and Rich.) Taubert in Benin and, Impacts of Climate Changes on the species. Republic of Benin, University of Parakou, Doctoral School of Agriculture and Water Sciences (ED-SAE). September 08, 2016 ; 153p.

ABSTRACT

This study focuses on ethnobotanical, dendrometric, morphological features of *Prosopis africana* in Benin and impacts of climate changes on the species. *P. africana* is native beacon for charcoal production. The objective of this study was to contribute to the domestication of this species, specifically: (i) to study the ethnobotanic importance of mesquite, (ii) to characterize ecologically mesquite populations following climatic zones, (iii) to evaluate morphological variability of *P. africana* following climatic zones in Benin, (iv) to evaluate the influence of mesquite shading on cassava yield in agroforestry system in Benin and then (v) to predict the effects of climate changes on the distribution of *P. africana* in Benin.

To achieve these objectives, ethnobotanical surveys and field studies for the morphological and dendrometric characterization of the species and finally an evaluation of mesquite effects on crops systems and effect of climate change on the species' distribution were made. *P. africana* is a multipurpose species in Benin. The diversity of knowledge on the use of the species was not well distributed among the respondents. The study also found that mesquite is distributed at varying densities in all climatic zones of Benin and according to land uses. Stand basal area, density, and the average diameter are respectively 4.47 m²/ha, 35 individuals/ha and 37.02 cm in farms; 3.01 m²/ha, 35 individuals/ha and 33.66 cm in fallows lands and 3.31 m²/ha, 53 individuals/ha and 29.61 cm in savannas. Morphological characteristics vary according to climatic zones and types of land uses. The influence of *P. africana* shading on cassava cultivation revealed a very highly significant difference between the plots under influence and those off influence.

The analysis of impacts of climate change on the geographic distribution of suitable habitat of *P. africana* shows that increasing precipitation could convert currently very favorable areas into unfavorable areas in 2050.

Keywords: *Prosopis africana*, Benin, West Africa, ethnobotany, dendrometry, morphology, Agroforestry, Climate Change.

ALOHOU Evariste Cossi. Fragmentation and Dynamics of Distribution of the Natural Sacred Groves in the Guinean Zone of Benin. Republic of Benin, University of Parakou, Doctoral School of Agriculture and Water Sciences (ED-SAE). January 06, 2017 ; 260p.

ABSTRACT

Land cover pattern in the guineo-congolese transition zone of South-East Benin shows some forest reserves which are surrounded by fragments of sacred groves, fallows, savannah, farms, habitations, plantations and swamps. The current thesis aimed at understanding this pattern by assessing the dynamic of forest fragmentation and its effect on the sacred groves species richness. This thesis innovated in Benin a new method of assessing forests fragmentation that combined each of functional and statistical approach to the spatial one. Combination of functional and spatial approach allowed collecting quantitative and categorical data about ecosystem services and local populations' perception on the spatial dynamic of ecosystems.

Statistical and spatial approaches were used to test auto-correlation between forest reserves species and those from sacred groves based on Multidimensional Positioning System, Moran index and indicator species analysis. Using this new method, it was able to explain the connectivity of sacred groves to forests reserves. We assessed the spatial and temporal dynamic of forests using three different Landsat images in order to define future scenarios and appreciate forests dynamic by the year 2050. Three categories of sacred groves including genus divinity sacred groves, ancestral and secret society sacred groves were identified. These groves of forest provide three important groups of services including regulation services, products supply and cultural services.

However, population perceived a regressive dynamic of their sacred groves due to natural caused, human pressures including agriculture, bush fire, forest harvesting and growing urbanization. Determinants that favored fragmentation were human pressure associated to the national agricultural policies. These determinants affected the size, floristic composition and isolation of fragments though climatic conditions were found favorable to forests reconstitution. The assessment of forests fragmentation using original reserves species connectivity to those from sacred groves has demonstrated the real occurrence of fragmentation. Sacred groves populations' structure indicated bad news on the future state of trees populations. The presence of indicator species, less degraded forests and wild species indicated that fragmentation appears as a danger for sacred groves. Simulation of forests dynamic using Markov model revealed a regressive trend of forests and their probable disappearance by the year 2050 if conservation measures were not strengthened.

Keywords: fragmentation, sacred groves, dynamic of landscape, Guinean Zone, Benin.

3.3- Abstracts of Master of Science and DEA dissertations

AMANOUDO Mesmes-Juste. Famer's perception of climate change effects on production of Cashew tree plantations (*Anacardium occidentale L.*) in department of Borgou. Benin : University of Parakou, Doctoral school "Agricultural and Water Sciences". 2017 ; 43p + annex.

ABSTRAT

The cashew sector is one of the most important sectors in Benin. Yet, it faces many problems including the adverse effects of climate change. The objective of this research is to study the perception of cashew producers on these constraints, the causes and effects of climate change on plantation nut production and the adaptation strategies developed by the latter. Using the formula of Dagnelie (1998), 294 producers were selected and surveyed as a sample study in the communes of Tchaourou, Nikki and Pèrèrè. On the basis of a semi-structured questionnaire, socio-cultural data were collected as well as their perceptions of the causes and climatic events affecting the yield of cashew plantations as well as adaptation strategies. In addition, climatic data were collected at the Parakou weather station.

The results obtained show that there is no significant difference ($P>0.05$) between the districts with regard to the age of the planters and the area of the plantations. On the other hand, the average age and yield of the plantations varied significantly ($P<0.05$) from one district to another. The majority of producers perceived climate change as one of the production constraints of cashew plantations. High winds (89.66%), prolonged drought (78.16%), vegetation fires (73.56%) and drought (70.11%) constitute the majority constraints reducing the production of plantations. Adult Peulhs and young Peulhs and Bariba have the perception that drought and its duration affects the production of cashew nuts while adults and young Nago followed by adults Bariba believe that the poor distribution of rainfall and the rainfall deficit are the Climatic conditions that affect the production of cashew trees. Temperature also increased over the period 1963 to 2015 and rainfall declined over the period 1971 to 2015. Trends in weather station data are consistent with perceptions of cashew producers.

Concerning coping strategies, the adults of the socio-cultural groups Nago, Peulh and Bariba and the young people mentioned the use of grafted plants, the association of crops in the thinning plantations and the realization of two mowing while the young Bariba propose pruning followed by maintenance and mulching. Improvement of plant material is one of the adaptive solutions to be promoted with the support of national research centers.

Keywords: Cashew tree, climate change, farmer's perception, adaptation.

WEDJANGNON Adigla Appolinaire. Ecological structure of *Mansonia altissima* A. Chev. population in Benin. Benin : University of Parakou, Doctoral school "Agricultural and Water Sciences". 2017 ; 32p.

ABSTRACT

This research on ecological structure of *M. altissima* population is part of a comprehensive study of the local endemism of species in Benin and the possibilities to extend its current habitat. Thus, a first measure was made in 20 permanent plots of 1 ha, installed in the semi-deciduous rainforest of Adakplamè.

It consisted to measure the diameter at the breast height (dbh) of individual trees with $\text{dbh} \geq 10$ cm and basal diameter (at 50 cm above ground level) of individuals with dbh between 5 to 10 cm using the measuring tape. Height of these individuals was measured using a graduated pole. The other trees with $\text{dbh} < 5$ cm were numbered. All measured trees were Total marked with stencil paint with two types of markings: trees identification marks and marks of the diameter measurement levels. *M. altissima* trees were geographically recorded using *Global Positioning System* (GPS) Garmin *etrex 10*. Spreadsheet Excel 2013 and the software R-3.3.2 were used for treatment and data analysis.

Three structural groups have been identified. The upper structural group (individuals with $\text{dbh} \geq 10$ cm), the average structural group (individuals with dbh understood between 5-10 cm) and the low structural group (individuals with $\text{dbh} < 5$ cm). The dendrometric characteristics of population in each structural group are respectively as follows: density N (*trees/ha*) = 9 ± 4 ; 6 ± 4 ; 30 ± 31 , stand basal area G (m^2/ha) = 0.27 ± 0.16 ; 0.030 ± 0.018 , average diameter D_m (*cm*) = 17.70 ± 7.52 ; 8.06 ± 1.30 , mean diameter of tree D_g (*cm*) = 19.23 ; 8.17 , Green index $IG = 0.074$; 0.28 ; 1.05 . The IG indicates a maximum aggregate distribution of trees in low structural group, which tends towards a random distribution when diameter increases. Diameter class distribution and total height distribution showed a decreasing exponential distribution with dominance of individuals from 5-10 cm and 10-15 cm diameter classes and 7 m to 15 m total height belonging to the lower arborescent stratum in settlement. These individuals represent about 80.92% of the total number of individuals sampled. Three classes of diameters (10-15 cm, 25-30 cm, 35-40 cm) cumulated the majority of stand basal area (55.41% of G (m^2/ha)).

The current structure of species is characteristic of a disturbed population. Occurrence sites of species are still under anthropic treats. Recruiting potential and regeneration potential are low, as well as the density of adults. It is therefore necessary to preserve the forest of Adakplamè. In order to thoroughly assess regeneration features of *M. altissima*, we recommend to study the other non-priority species, which occur within the permanent plots and may influence the regeneration of the studied species by their size, vegetation cover, density or all other ecological parameters.

Keywords: African black walnut, dense semi-deciduous forest, Adakplamè, permanent plot

DOSSA A. K. Benjamin. Sustainable management of trees outside forest : cases of *Azadirachta indica* (A. Juss) in a peasant originality of coppie on forest in Benin. Benin : University of Parakou, Doctoral school "Agricultural and Water Sciences". 2017 ; 43p + annex.

ABSTRACT

Management of *Azadirachta indica* out of forest tree populations was assessed in Benin using of megatranssect methods. Therefore, two sets of main roads were chosen which are: Parakou –N'Dali – Bembèrèkè – Kandi and Parakou – Djougou in the northern and Bohicon – Covè – Kpédékpo – Ouinhi – Bonou – Adjohoun – Azowlissè – Dangbo –Porto-Novo and Ouidah – Comè – Lokossa – Dogbo – Azovè – Abomey – Bohicon in the south zone. Along these road axes within a radius of about 500 m in open countryside and in built-up areas, *A. indica* trees were inventoried.

The dendrometric data (dbh, pruned pit height, number of rejects branches, circumference and height of these rejects) were collected on individuals of *Azadirachta indica* pruned at least once. The data were processed using the Excel spreadsheet and analyzed with the software R after the test of normality and average homogeneity of the statistical variables measured. The results obtained show that the optimum cutting height varies from 1.70 to 7 meters. The results of analysis of the Kruskal Wallis test show that the cutting height of the [2-3 [, [3-4 [, [4-5 [, [5-6 [, [6-7 [and [7-8 [and the cut diameter classes of [30-40 [, [40-50 [, [50-60 [, [60-70 [, [70-80 [, [80-90 [and ≥ 90 produce a large number of discards that grow both in diameter and height. Cutting diameter classes ≥ 90 cm produce an average of 30 releases. The height and the diameter of the discharges evolve proportionally as a function of the cutting height and the diameter of the stump. In the northern zone, *Azadirachta indica* trees measured outside the forest had average cut diameters of 69.73 ± 22.60 cm with an average cutting height of 4.91 ± 1.16 m. These same trees measured in the northern zone produced an average of 27 ± 18.93 discharges with average diameters of 5.34 ± 3.10 cm and an average height of 3.40 ± 1.82 m.

On the other hand, in the southern zone, *Azadirachta indica* trees measured have an average diameter of 38.39 ± 17.43 cm with an average cutting height of 2.92 ± 0.91 m. These trees produce an average of 19 ± 6.06 discharges with average diameters of 3.31 ± 2.28 cm and an average height of 2.38 ± 1.49 m.

Concerning the impact of pruning, it allows a sustainable (repeated) and perennial exploitation of the organs of the species on the one hand and on the other hand modifies the phenology of the species by decreasing the quantity of fruit which may compromise the future natural regeneration of this species.

The recommended solutions aim to improve the sustainable and sustainable management of the persistent populations of *Azadirachta indica* in Benin.

Keywords: pruning, *Azadirachta indica*, sustainable management, trees outside forests, coppice on forest, Benin

BODJRENOU T. Raoul. Ecological characterization and essay of vegetative multiplication by stem cuttings of *Pterocarpus erinaceus* at Kétou. Benin : University of Parakou, Doctoral school "Agricultural and Water Sciences". 2017 ; 58p + annex.

ABSTRACT

Ecological characteristics of *Pterocarpus erinaceus* have been studied on the basis of a forest inventory in the light forests and wooded savannahs of protected forest of Dogo. Dendrometric measurements, such as height, diameter at the breast height (dbh) have been made on all *P. erinaceus* trees in 40 circular plots of 20-meter radius. The regeneration was assessed by counting juvenile individuals (dbh <10 cm). The structural parameters such as density of *P. erinaceus* population, the burrow area, mean diameter and mean height were determined. Results enabled to note that the population density is 25 trees/ha and the trees have an average height to 6.59 m with an average diameter to 16.4 cm. The diameter structure of *P. erinaceus* generally reveals an abundance of individuals of small diameters with a predominance of individuals with diameters between 15 and 20 cm and a total absence of individuals of large diameters. The whole stand has a normal bell distribution, characteristic of a mono-specific population. In order to provide a real alternative to its regeneration and domestication, propagation by stem cuttings of the species has been done.

For this reason, an experiment was conducted to evaluate the effect of different doses of naphthalene acetic acid (NAA) (0, 500, 750, 1000 and 1500 mg/l), substrate type (black sand and sand Thin) and cuttings used ([1,5-2] and [2,5-3] cm in diameter).

During the conduct of the test, the following parameters were determined: budding rate; the rate of bud burst and the rate of degenerate cuttings. The results showed that the increase of the NAA reduce the budding rate and the bud burst rate but the probability of bud and leaf on cuttings with 0 mg/l of NAA was similar to those of 500 mg/l, and 750 mg/l of the NAA. The size of the stem diameter of *Pterocarpus erinaceus* has a marginal effect on the rate of degenerate cuttings.

Keywords: Ecological characterization, stem cuttings, Naphthalene Acetic Acid, *Pterocarpus erinaceus*, Benin

AMANOUDO Mesmes-Juste. Traditional use and characterization of woody plant communities of the forest sanctuary of Ewè-Adakplamè. Benin: University of Parakou, Faculty of Agronomy. 2016; 74p + annex.

ABSTRACT

The objective of this study is to identify the traditional uses and to characterize the flora of the forest sanctuary of Ewè-Adakplamè. The characterization of this forest was done based on 40 surveys of 1000 m² plots based on simple random sampling. A total of 32 plant species belonging to 20 botanical families were inventoried. The structural parameters such as tree density, mean diameter, mean basal area, total height, Lorey height and regeneration densities were calculated. The height-diameter relationship was established as well as the structures in diameter and height. Data processing was done using the R3.1.2 software under a non-metric multidimensional scaling to individualize the different plant communities which were: semi-deciduous dense forest dominated by *Ceiba pentandra* and *Mansonia altissima* on the one hand and *Ricinodendron heudelotii* and *Triplochiton scleroxylon* on the other hand. Species richness for both plant communities was 23 and 30 species considering woody species (dbh \geq 10 cm). The values of the Shannon index for these two plant communities were respectively 3.81 and 3.34 bits. The value of the Pielou fairness was 0.74 and 0.78.

The flora of this forest is characterized by a strong representation of the Guinean-Congolese species (43.75%) and Guinean species (34.38%). The phanerophytes are prevalent regarding the biological types, just as sarcochores for the types of dissemination of the diaspores. The values of the Blackman (> 1) indice obtained for the two studied plant communities indicated an aggregated distribution or forest stands bouquets. The density of natural regeneration was on average 1475 stems/ha. The interviews allowed to describe the different forms of use of woody plant species by local residents of the studied forest and calculate the values of use associated with these species.

Various uses are made of these species: medicinal, food, fuel wood, timber and construction wood. The principal component analysis of matrix (forms of use * species) has shown that people do not generally exploit timber from the species they consider useful for food supply and traditional medicine.

Mansonia altissima, *Azelia africana*, *Triplochiton scleroxylon*, *Milicia excelsa* and *Ceiba pentandra* were the most used plant species. Paradoxically, all these species were not well represented in the forest except for *Triplochiton scleroxylon* and *Ceiba pentandra*.

Keywords: Structure, uses, Forest, improvement, Ewè-Adakplamè

WEDJANGNON Adigla Appolinaire. Ethnobotanical study, ecological characterization and mass propagation of *Mansonia altissima* (A. Chev.). Benin: University of Parakou, Faculty of Agronomy. 2016; 59p.

ABSTRACT

The overall goal of this study was to contribute to the sustainable management of *M. altissima*, has been conducted in the sacred forest of Adakplamè next to the local community. Three ethnic groups (Mahi, Holli, Nago) have been selected to analyze different uses and importance of *M. altissima* in Benin. A floristic inventory based on reading of surface has been done in the sacred forest to characterize the population structure. Different pre-germinative treatments has been applied to seeds after seven months of studying of management about germinations conditions. Different doses of naphthalene acetic acid (NAA) have been applied to the cuttings of different size of diameter to test auxine effect and diameter on cutting.

Three forms of species uses have been identified: construction, traditional medicine and packing. The uses of organs depend on ethnic groups and gender. Wood is more used ($VUT=10.05$) than leaves ($VUT=2.35$) and bark ($VUT=1.75$). The combination of bark to other species treat fever in the period of children teeth appearance, the leprosy and is used like bracing. *M. altissima* is a very preferential species ($Ri=37.5 < 80\%$) in this sacred forest. The population density is 20 stems/ha. The medium diameter is of 21.76 cm. The basal area is 0.88 m²/ha. Individuals less than 20 cm of diameter dominate considerably the population. The adjusted Weibull 3 parameters distribution showed, very few big size individuals. The density of regeneration is 314 stems/ha of sprig and 148 stems/ha of sapling and purchis. Different doses of NAA haven't improved the regeneration rate of cutting. Two categories of diameter used had no significant effect on cutting. The seed soaking into boiling water during 60 seconds increase significantly the germination rate from 42 to 81% among different treatments.

This treatment improved the latency time, the speed of germination and the mean duration of seed germination. A fast intervention about the sacred forest to reduce human pressure and secure forest resources will be favorable to the species recruitment. Some new investigations must be undertaken by acting on many parameters to deepen possibilities of multiplication by the domestication tests.

Keywords: ethnobotany, ecology, mass propagation, African black walnut, Adakplamè.

DOSSAJ. J. S. Asaël. Socio-economic importance, ethnobotany and reproduction by cuttings of *Artocarpus communis* (J. G & G. Forster) in Guinean zone in Benin. Benin: University of Parakou, Faculty of Agronomy. 2016; 62p + annex.

ABSTRACT

The economic importance, ethnobotanical uses and propagation by cuttings of *Artocarpus communis*, have been studying through the inquiry or investigation and the experiment in southern Benin. The scientific knowledge on *Artocarpus communis* have still fragmentary and show that its organs of multiple uses were regularly consumed and commercialize by the different ethnics groups.

This study aims to: (i) inventory the ethnobotanical knowledge of *A. communis* in southeastern Benin, (ii) evaluate the economic importance of the species *A. communis*, (iii) Experiment patterns of vegetative propagation of *A. communis*. From the data collected, quantitative ethno botanical parameters were calculated and subjected to Principal Component Analysis (PCA). As for the reproduction of *A. communis*, two techniques were used namely stem cuttings and root cutting to identify the most suitable mode of reproduction. As results the study show that *A. communis* is a multipurpose species which is involved in food, medicinal, energy, crafts, and cultural uses. Similarly, the diversity index was significantly higher for men (ID = 0, 75) than women (ID = 0, 48) suggesting that men make various uses of the species. The organ who is more used is a fruit. At economic domain the means yield of *A. communis* was risen to 2.2 ton/ha so to speak that the benefit is 2183105.59 FCFA. However cuttings pre-treatment with auxin (650 NAA) is the best way to fasten budding as far as the species' vegetation propagation is concerned.

Moreover, there is a significant difference in parameters average as far as watering frequencies are concerned ($p < 0.01$). The best technical for multiplication of the species *A. communis* is root cuttings.

Keywords: *Artocarpus communis*, Guinean zone, socioeconomic importance, ethnobotany, consumption, propagation by cutting

TONOUEWA Jesugnon Fifamè Murielle Féty. Influence of edaphic conditions and age of plantations on the physical and mechanical properties of *Gmelina arborea* Roxb wood in Benin.

Benin: University of Parakou, Doctoral School Pluridisciplinary. 2014; 58p + annex.

ABSTRACT

The influence of soil type and age of plantations on physical and mechanical characteristics of the wood of *Gmelina arborea* Roxb. Has been studied in Benin in three climatic zones. We sampled four (4) plantations to North, one (1) to center and nine (9) plantations in South Benin. By reason of the strong availability from the plantations in the South Benin, an analysis of variance has been made to compare the features of the *Gmelina* in that zone. 309 samples normalized to different sizes served to measures.

203 cubes and 44 carrots served of the near infrared spectroscopy for prediction of properties *Gmelina*. The plantations of *Gmelina* on wet soil present high density and hardness. The moisture content of soil doesn't influence the stability of service of wood *Gmelina arborea*. The plantations on ferruginous soil present high physical and mechanical characteristics. Otherwise, these features vary little between the plantations of 18 years and 44 years.

Keywords: influence, soil type, age, physical and mechanical characteristics, *Gmelina arborea*, Benin.

GNONLONFIN Laurent. Structural characteristics and different ethnics use mode of the remanent populations of *Diospyros mespiliformis* in Tchaourou. Benin: University of Parakou, Doctoral School Pluridisciplinary. 2014

ABSTRACT

Diospyros mespiliformis is a multipurpose species widely used in Africa by local communities. The main objective of this study is to provide informations for the sustainable management of *Diospyros mespiliformis* Hochst under present and future climate in Tchaourou district. The specific objectives were to access (i) ecological structure and structural characterization in African ebony population in Tchaourou district (ii) use values, pattern and diversity of use and different knowledge associated to the species. Structural characterization of African ebony trees is carried out on basis of floristic inventory in circular and rectangular plots of 1000 m². In total, 165 plots were installed. In each plot, over data were collected using systematic random sampling and questionnaires and focus on distribution pattern, mature densities, regeneration density, size class distribution and utilization. The structural characterization and ecological structure of *Diospyros mespiliformis* populations were assessed in Tchaourou district using sampling method and multivariate analyses including principal component, and canonical discriminate analyses. The use values, pattern and diversity of use were study from 10 ethnic groups, 213 people were interviewed in the study area using semi-structured questionnaires. Principal Component Analysis was applied to analyze the use value and the use patterns of *D. mespiliformis* for the different ethnic groups sent study.

Data analysis revealed that *D. mespiliformis* populations were established in mainly four habitats (parklands, savannah woodlands, gallery forests and woodlands) and that the frequency of distribution of the species significantly differ from one habitat to another. Also, the mean density of matures individual varied from 35 stems/ha in the parklands to 60 stems/ha in the gallery forests. The repartition by class of diameter of the populations of *D. mespiliformis* showed an asymmetric left distribution. The mean average stand basal area is very weak (0.03 m²/ha) in the parklands and very high (1.68 m²/ha) in the savannah woodlands. All interviewees in the study area knew at least one use of *D. mespiliformis*.

The various uses identified were medicinal (100%), handicraft, commercial and domestic (56%), medico-magic (54%), veterinary (31%), cultural (72%), food (86%). The various parts involved in these types of uses were: fruits (shell (2%), pulp (22%) and seeds (36%)), bark (17%), leaves (9%), roots (3%), flowers (1%) and branches (10%). The ethnic group consensus values for *D. mespiliformis* parts showed that the barks and leaves are used the most. The interviewees diversity value (ID) and equitability value (IE) indicated that knowledge concerning *D. mespiliformis* use was not distributed homogeneously among the ethnic groups.

In view of its domestication potential, it is crucial that traditional tribal knowledge of *Diospyros mespiliformis* be preserved and integrated into management policies.

Keywords: *Diospyros mespiliformis*, utilizations, Tchaourou

3.4- Abstracts of Bachelor of Science dissertations

DOSSOU Justin. Contribution to the domestication of *Crassocephalum crepidioides* (Benth.) S.Moore : germination, growth and ecological exigency for this production in nursery. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 45p + annex.

ABSTRACT

The study to contribution to the domestication of *Crassocephalum crepidioides* was conducted in the district of Adakplamè in the south-east of Benin. *Crassocephalum crepidioides* is a species native of tropical Africa and Madagascar.

The study aimed at researching the conditions of production in nursery of *Crassocephalum crepidioides* in the frame of the market garden produce diversification and struggle against food insecurity. Therein, seeds germination test of *Crassocephalum crepidioides* have been done on 1800 seeds for length of 45 days on traditional seed bed. This test showed a germination rate of 15.1%.

The plants stemming from seed bed have been planted out on two blocks constituted of six planks (sand bed) each. Fertilization of soil, frequency sprinkle and umbrage are factors studied per interchange to the preliminary factors (fertilization and frequency sprinkle).

Fertilization of soil with the dung of cow and the droppings of poultry showed a highly significant effect ($p < 0.1\%$) on the growth parameters (height of the plant; number of leaves; length and width of the leaves; number of internode) and the criteria of output (weight of the aerial part and weight of the underground part). Five weeks after the pricking out, the mean values obtained respectively for dung of cow, droppings of poultry and control present themselves as follows: total height (22.85; 23.33 and 11.50 cm), length of the leaves (19.90; 20.52 and 13.18 cm), width of the leaves (7.19; 7.24 and 4.85 cm), weight of the underground parts (0.09; 0.07 and 0.05 kg), weight of the aerial parts (0.19; 0.15 and 0.09 kg).

The umbrage on plants showed a highly significant effect ($p < 0.1\%$) on the growth parameters (height of the plant; number of leaves; length and width of the leaves; number of internodes) and the criteria of output (weight of the aerial part and weight of the underground part). Five weeks after the pricking out, the mean values obtained respectively for the shadies and no shadies plants present themselves as follows: total height (23.70 cm and 14.75cm), number of leaves (18.00 and 22.50) length of the leaves (19.28 cm and 16.45cm), width of the leaves (7.04 cm and 5.82 cm), number of internode (3.73 and 9.77), weight of the underground parts (0.09 and 0.06 kg) and weight of the aerial parts (0.15 and 0.14 kg). A vantage production of *Crassocephalum crepidioides* requires the fertilization of soil with the dung of cow or the droppings of poultry under the umbrage or out umbrage but the plants produced out umbrage are more green.

Keywords : Germination, growth, ecological exigency, *Crassocephalum crepidioides*

DANNON S. Casimir. Essay of vegetative multiplication and structural characterization of *Prosopis africana* (Guill., Perrott. et Rich.) Taub settlements at Ségbana. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 54p + annex.

ABSTRACT

This work achieved for the obtaining of the Bachelor in Agriculture Sciences is subdivided in two parts. The first part concerns the diagnosis of the forest Cantonment of Kandi that has for mission the administration, the planning, the sensitization and the enrichment of its forest domain (classified forests, communal forests, local forests). At last of this part, one notes that the forest Cantonment of Kandi is confronted to some constraints among which face the high pressure anthropique on the forest gases. The objective of the second part is to contribute to the lasting conservation of the *Prosopis africana* (Iron wood). Indeed, to test the effect of different doses of Naphthalene Acetic Acid (NAA) and of the diameter of the cuttings on the resumption (budding and the opening) of the cuttings of stem and root, two factors have been considered: the diameter of the cuttings and the hormone of rooting. So, with the modes, diameters of 1.5 cm and 3 cm for the first factor and the different doses of NAA (0 mg (witness), 300 mg, 600 mg, 900 mg, 1200 mg and 1500 mg) for the second factor, twelve treatments have been applied to the cuttings of stems and roots. Every treatment is represented fifteen (15) time. The segments of stems and roots are planted obliquely in sachets of polyethylene containing compost and the forest sand. The results at the end of the tests show the best rates of budding ($T7= 46.67\%$; $T8=80\%$; $T9=73.33\%$; $T10=46.67\%$; $T11=80\%$ 66.67% ; $T12=73.33\%$) and opening ($T7=53.33\%$; $T8=40$; $T9=33.33$; $T10=40\%$; $T11=53.33$; $T12=53.33$) to the level of the cuttings of stem of 3 cm of diameter. NAA doses doesn't have a meaningful effect on the rooting of the cuttings. The results gotten at the level of the root cuttings don't show any effect of budding and the opening of the cuttings. To characterize the structure of the populations of *P. africana* in different plant formations (savannah, fallow and field) of the Township of Ségbana, a forest inventory inside the circular small square of 1000 m² installed in three plant formations (Fields, fallows and savannah) through the five District of Ségbana Township. The total height, the diameter at the breast height (DBH) have been measured on the individuals of *Prosopis africana*.

Therefore, the dendrometric characterization shows the most elevated values of the density, of the basal area for the savannah. The horizontal structure of whole of the populations of Mesquite (*Prosopis africana*) and by plant formations, adjusted to Weibull 3-parameters distribution showed a positive asymmetric distribution, characteristic of the monospecifics populations with predominance of young trees within these populations. This justifies a high exploitation of this ligneous therefore.

Keywords: *Prosopis africana*, vegetative multiplication, Ségbana, savannah, field and fallow

GBEMAVO A.G.D. Médard. Assessment and morphological characterization of shea trees (*Vitellaria paradoxa* C. F. Gaertn) infested in different forms of lands use within the shea park of Bohicon. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 45p.

ABSTRACT

This research was carried out in the shea park of Bohicon. The objective was to determine the proportion and morphological characteristics of shea trees infested with different habitats in order to identify the habitat most favorable to the conservation of the species. To this end, an inventory of infested trees was carried out in the fields, savannahs and fallows of the study park. At the level of each habitat, the morphological data were collected on trees and regenerations shea. The presence or absence of *Tapinanthus sp* and the damage of the stem borers on the shea trees were noted. The proportion of infested trees was estimated. Parametric and nonparametric tests were used to compare the morphological characteristics of trees between habitats. The relationship between the different attack proportions of *V. paradoxa* individuals and systems (fields, fallows and savannahs) was modeled using a generalized linear model of the beta family. The results showed that shea trees in the shea park of Bohicon are more vulnerable to the infestation of *Tapinanthus sp* (24.80%) than to the stem borers (6.20%). Low shea tree attack rates by *Tapinanthus sp* were obtained in the savannahs (21.02%) while the small proportions of attack on the stem borers were obtained in the fields (4.89%).

The morphological characteristics of the shea trees attacked by *Tapinanthus sp* do not vary significantly ($P > 0.05$) according to the habitats. As for the trees attacked by stem borers, only the height of the trees varies significantly ($P < 0.05$) between habitats. The savannahs appear to be better conservation habitats for *V. paradoxa* trees against attacks at *Tapinanthus sp* while the fields appear to be better conservation habitats for *V. paradoxa* trees against stem boring insects.

Keywords: *Vitellaria paradoxa*, infestation, shea park, Bohicon, Benin

TCHANGO Oloufoumi Idole. Contribution at the conservation of medicinal ligneous plants at Agonli (Benin): ethnobotanical importance and structural characteristics. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 54p.

ABSTRACT

This study aimed to inventory the medicinal ligneous plants in municipality of Covè and therapeutic uses practiced in the region. Using a list of questions, we interviewed 120 persons in the region. Thus, 120 tree species belonging to 29 different floristic families were inventoried. Results showed that with these medicinal plants the populations treat 57 types of diseases. These diseases are mainly treated by the foliage which is the most widely used plant organ and by the decoction which represents the most dominant mode of preparation in the local population. An inventory of medicinal plants was carried out in plant formations (field, fallow, savannah) in order to describe their structure, based on dendrometric parameters such as height, diameter, basal area, etc. Measurements of the diameter and height of the trees were made in 30 rectangular plots. The results indicate that stand density is higher in savannah formations (100.90 trees/ha), while the average height and mean diameter of all trees have higher values in the fields. Moreover, the three vegetation formations studied (field, fallow, savannah) do not have the same values for the calculated dendrometric parameters. The whole stand has a structure ($1 < C < 3.6$) asymmetric distribution as positive or asymmetric left, characteristic of monospecific stands with predominantly young or small diameters.

Keywords: Medicinal plants, Dendrometric parameters, Ethnobotany, Conservation

KASSA Sorotori Césaire. Ethnobotanical study and structural characterization of *Antiaris toxicaria* in district of Adakplamè. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 49p.

ABSTRACT

This research aimed to study the endogenous knowledge of populations and to characterize the structure of *Antiaris toxicaria* within the sacred groves of Adakplamè. In order to achieve this objective, a survey was carried out in five villages in the district of Adakplamè (Adakplamè, Agonlikpahou, Aguigadji, Dogo, Ewè).

Individual and semi-directive interviews were conducted on 100 respondents to assess population uses of the species. Then 35 plots were installed within the sacred groves to characterize the structure of *Antiaris toxicaria* as well as its natural regeneration. Results shows that there is no significant relationship between ethnicity and use froms emnumerated as well as between gender and the uses on *A. toxicaria*. However, Holi and Nagot are the socio-cultural groups that place greater emphasis on the use of species with use values of 3.14 and 3 respectively. Mahi are the only socio-cultural groups that use the species for one or two use categories whose kwoledge is not homogeneous ($EI < 0.5$). While Holi and Nagot use it for multiple uses with a homogeneous distribution of knowledge among the respondents. In the sacred groves of Adakplamè, the density of adult trees of *A. toxicaria* is 38 trees/ha with a predominance of individuals with an average diameter of 55 cm. *Antiaris toxicaria* populations have a bell-shaped structure with a predominance of individuals of average diameter. This study suggest the promotion of the conservation of the species by awareness of the local authorities responsible for the sacred groves on its sustainable management in order to perpetuate the species.

Keywords : ethnobotany, structural characteristics, *Antiaris toxicaria*, Adakplamè.

GBODO Laurent. Socio-cultural assessment and essay of multiplication by stem cuttings of *Zanthoxylum zanthoxyloides* in the district of Adakplamè. Benin : University of Parakou, Faculty of Agronomy. 2016 ; 44p. + annex

ABSTRACT

This study was carried out in southern-Benin precisely at Adakplamè, district of the municipality of Kétou. It was carried out in two stages. The first consisting of diagnosing Kétou forest cantonment and a second part consisting of a socio-cultural assessment and a propagation test using *Zanthoxylum zanthoxyloides* in Adakplamè (Kétou). The central objective of this study is to contribute to conservation and sustainable management of *Z. zanthoxyloides*. To this end three ethnic groups (Mahi, Holli, Nago) were chosen for an analysis of the different uses they make of them ; an experiment was made on the mode of vegetative reproduction of the species.

Thus different doses of 1-naphthalene-acetic-acid (NAA) were applied to cutting of various diameter on the stem cuttings. Five forms of uses of the species have been identified : traditional medicine, energy wood, timber, vegetable brush, and diet. Note that there are no significant differences between uses of organs and socio-cultural groups. As for the production of *Z. zanthoxyloides*, only one technique was tested, namely stem cuttings. Four different doses of growth phytohormones (0mg, 400mg, 800mg, 1200mg) were applied to cuttings of varying diameter to test the effect of auxin and diameter thickness on cuttings. Analysis of results shows that NAA 1200 mg accelerates the appearance of *Zanthoxylum zanthoxyloides* buds and diameter D2 (2.5 – 3 cm) has a better budding rate than diameter D1 (1.5 – 2 cm). The diameter D2 (2.5 – 3 cm) also allows the branches to develop faster than the D1 cuttings (1.5 – 2 cm). Naphthalene acetic acid has a significant effect on stem cuttings *Z. zanthoxyloides*. The size of the cuttings has significant effect on the stem cuttings of *Z. zanthoxyloides*.

Keywords : *Zanthoxylum zanthoxyloides*, multiplication, sustainable conservation, socio-cultural assessment

AKIN Y. Yanik. Experiment of propagation by seeds and stem cuttings of *Ceiba pentandra*. Benin : University of Parakou, Faculty of Agronomy. 2015 ; 57p + annex.

ABSTRACT

This internship was carried out at the forestry of Parakou (Benin). This camp is one the Government institution that aims at preserving forest resources and is well involved in the national reforestation program. The scope of the current survey was to study the possibility of the indigenous *Ceiba pentandra* multiplication by seeds and cuttings. Seeds and cuttings were harvested from nurse trees of *Ceiba pentandra* located in Parakou. Four treatments with three (3) repetitions, including the control were applied for the multiplication by seeds. Treatments consisted of soaking seeds into cool water for 24 hours (TE24) and 72 hours (TE72) and the last treatment consisted of soaking seeds in boiled water for 10 minutes (TEC). A sample of 100 seeds as used for each treatment. As for the multiplication by cuttings, five treatments with one control were applied.

Treatments consisted of soaking cuttings into naphthalen acetic acid (NAA) substance for 10 minutes at different doses: 300 mg (D300), 600 mg (D600), 900 mg (D900), 1200 mg (D1200) and 1500 mg (D1500). Twenty five cuttings were used for each treatment with two repetition by treatment. We grow cuttings in pots filled with local soil substrate. The experimental site was the reforestation reserve of the forestry. Results showed that the germination power of *Ceiba pentandra* was in general (all treatments included) low ($t < 19\%$). Only treatment consisting of seeds soaking into boiled water allowed rapid growth of plants. Doses of 300mg, 600mg and 900mg allowed better development of roots cuttings (main root length and number of roots) than the control. A dose of the NAA substance over 600mg was not favorable for cuttings growth and led to high mortality (91%). We conclude that vegetative multiplication of the indigenous *Ceiba pentandra* would be more preferable than multiplication by seeds.

Keywords: *Ceiba pentandra*, germination, seeds, cutting, NAA, roots, Benin

AZONGNIDE Gbèdothichthé Gwladys. Reproduction capacity by seeds and stem cuttings of *Blighia sapida*. Benin: University of Parakou, Faculty of Agronomy. 2014; 48p + annex.

ABSTRACT

The obtaining of the parchment of the end of training in professional license requires from us, students agronomists a professional internship the outcome of which is the writing of this report articulated in two big parts.

The first part presents the diagnosis of our reception center which is the forest stationing of Dassa-Zoumé. This stationing has for main mission the conservation and the preservation of the biodiversity of the vegetable formations of the department of Hills. To reach its mission, the stationing has seventy-four forest agents and three not forest staffs. Also he is in connection with partners (PGFTR, PAGEFCOM etc.). However, in spite of the strengths and the opportunities which the stationing has, it is confronted with constraints adult of which is the degradation of the forest ecosystems. During our stay in this structure we participated in the activities of reforestations and we have been filled with wonder by the determination of the forest agents and the agent who not forester to overcome their mission, in spite of the insufficiency of means.

The study of reproduction capacity by seeds and stems cuttings of *Blighia sapida* tests two reproduction modes of *Blighia sapida*, namely the sexual reproduction and asexual reproduction. Fresh and mature seeds and stems cuttings were collected on individuals of the species then installed in tree nursery. Four treatments were applied to seeds: witness, scarification at blade, soaking in water for 24 hours and 48 hours. The results showed that the ripe, fresh and mature seeds have a very good capacity to germinate with 94% of rates of seeding on average. The pretreatment do not influence the seeding of seeds. The species can be also reproduced by stems cuttings but the circumference of the seed companies and the treatment influence the development of cuttings. Globally, there production by seeds presents better success rates to the stem cuttings.

Keywords: *Blighia sapida*, seeding, budding, leafy cuttings.

DJIGBODJAFE D. Bienvenu. Potential of propagation by stems cuttings of *Triplochiton scleroxylon*. Benin: University of Parakou, Faculty of Agronomy. 2014; 44p + annex.

ABSTRACT

This study tests the artificial regeneration by stem cuttings *Triplochiton scleroxylon*. It generally aims to contribute to the mastery of technical production plant by cuttings of *Triplochiton scleroxylon* rod. Stem cuttings were collected from individuals of the species then installed in nursery pots bag containing black sand. Four treatments were applied to cuttings: young leaves, young leafless, leafy older. The results showed that the cuttings of *Triplochiton scleroxylon* to be reproduced by stem cuttings. The type of cutting did not significantly influence the recovery bud.

Keyword: *Triplochiton scleroxylon*, treatment, cuttings.

HOUSSOU Adétoundji Daouda. Contribution to development of vegetative production techniques by stem cuttings of *Mansonia altissima* plants. Benin: University of Parakou, Faculty of Agronomy. 2014; 42p + annex.

ABSTRACT

This study forms part of the final Professional Degree Intern ship training at the Faculty of Agriculture (FA). This course, which lasted three months, has allowed us to do at first, a diagnosis of forest Cantonment of Kétou while identifying the strengths, weak, opportunities and threats of this structure. This allowed us to underst and how the organization, the activities of the structure and the constraints it faces. One of the most important constraint is: low level of organization for the management and monitoring of the sustainable use of forest resources. The second part tests the mode of *Mansonia altissima* artificial regeneration by stem cuttings. Drill cuttings were collected from individuals of this species in the nursery and the ninstalled on one type of soil. Four treatments were applied to the stem cuttings: Elderly leafy, leafy Young, Elderly and Young leafless leafless. The results showed that young leafless stem cuttings have a very good ability to resume buds with high rates of 79.36% and the appearance of the leaves with a high rate of 59.52%. So young leafless cuttings can bere commended for the effective multiplication of the species.

We can then reproduce vegetatively *Mansonia altissima* while taking care to control factors and ages leaves on the stems of the cuttings.

Keywords: *Mansonia altissima*, reproduction, stem cuttings.

CAPO-CHICHI Yélognissè Régis-Roland. Study of the importance of melliferous plants of the rainy season at Yarra (Sinendé). Benin: University of Parakou, Faculty of Agronomy. 2014; 42p + annex.

ABSTRACT

Started June 24th at Apiarianand Fruiterer Cooperative and Integrated inthe area of Sinendé, village of Yarra, this professional internship for obtaining of the parchment of bachelor in Agronomy consisted to analyze the working of the hot institution for identify the strength, weakness, oportunity and threat (SWOT) of institution. The main threat identified is the weak knowledge of some melliferous plants while the rainy season.

The second part of study that consisted to contribute at an approach of solution to this threat concern the inventory and the importance of melliferous plants of the rainy season at Yarra (Sinendé). Melliferous plants around a beehive of Yarra have been studied with the help of phenologics lists. These list are executed in the observation air of 1km of rayaround beehive which is constituted of ten beehives cylindrical of sheet metal. Melliferous plants are composed of 45 species. It contains 40 kind and 25 families. Families more rich in species are Leguminosae and Poaceae (6 species about 13.33%), the Rubiaceae (4 species means 8.88%). Melliferous plants are constituted of 20 species of tree and youth tree and 25 species herbaceous. They contain 17.78% of nectar plants, 48.89% to 33.33% polliniferous plants of productive plants of nectar and pollens. These plants are very diversify and can support an apiculture during all the rainy season.

Keywords: melliferous plants, Yarra, visual inventory, nectar, pollen

BODJRENOU Raoul. Inventory and form of exploitation of wood energy species at Kétou. Benin: University of Parakou, Faculty of Agronomy. 2014; 34p + annex.

ABSTRACT

This study was carried out using species inventoring within forests and sociological investigations. The overall goal was on the one hand to make inventoring of fuelwood species and on the other hand to determine their felling diameters and heights. A sample of 240 producers and consumers was investigated in order to determine criteria of species preference. Felling diameters and heights were determined for the sixth most preferable species. Indeed, a number of 180 individuals were measured in the forest. Data collected up on species consisted of diameters and height of dead stumps and stump sprouts. Other categorical data such as barking and branches cutting were also collected up on species. Student's test was used to determine criteria of species preference. Graphics such as bar and pie charts were designed with Excel to determine stumps diameters and heights. Results showed that the most preferable species as fuelwood were *Zanthoxylum zanthoxyloides* (100%), *Prosopis africana* (100%), *Lophira lanceolata* (99.16%), *Isobertina doka* (97.08%), *Anogeissus leiocarpa* (96.66%) and *Vitellaria paradoxa* (95.83%). Identified species belongs to seventeen botanic families among which Ceasalpiniaceae (16.66%) family was predominant. Diameters classes of stumps were [25-30[cm for *Zanthoxylum zanthoxyloides*, *Lophira lanceolata* and *Anogeissus leiocarpa* ; [30-35[cm for *Isobertina doka* and *Prosopis africana* and [20-25[cm for *Vitellaria paradoxa*. As for height classes of stumps, *Zanthoxylum zanthoxyloides*, *Prosopis africana*, *Vitellaria paradoxa* and *Anogeissus leiocarpa* are frequently felled within [11-14[cm, [14-17[cm for *Lophira lanceolata* and *Isobertina doka*. Availability and facilities for charring and burning were criteria of most preferable species.

Keywords: species, fuelwood, fire wood, exploitation forms, Kétou

MAMA Kamarou- Dine. Experiment of propagation by seedling of seeds and stem cuttings of *Azelia africana*. Benin: University of Parakou, Faculty of Agronomy. 2014; 39p + annex.

ABSTRACT

Azelia africana is a local species severely threaten in Benin due to human pressure on forests ecosystems. This study aimed at testing the propagation of *Azelia Africana* with cuttings and seedling techniques in order to identify the suitable technique for the species propagation. To do this, three treatments of pre-germination were tested for the seedling technique (i) seeds were soaked in boiled water over a period of 10 min and in tap water over a period of one day (ii) seeds were scarified and soaked in tap water over a period of one day (iii) seeds were soaked in tap water over a period of three days. As for the cutting technique, two treatments included covered and uncovered cuttings were tested for two categories of individuals: (i) individuals with DBH <10cm (ii) individuals with DBH >30cm. Results showed that all the treatments enhanced seeds' speed of germination. The highest rate of germination (75% of seeds were germinated) was recorded from seeds soaked in boiled water. Besides, results revealed there was no significant difference in the regeneration speed among individuals with DBH <10cm whatever the treatment. However, the highest rate of seeds germination (28%) was observed from the covered cutting.

Keywords: *Azelia Africana*, propagation, seedling technique, cutting technique.

4- Participation to symposium and conferences

Years	Symposium	Participatings
2016	3 rd Symposium of University of Parakou. Scientific Research at Service of Sustainable Development. University of Parakou, Benin. 2016 Dec 7-9.	Christine Ouinsavi (Professor) Alohou Evarist Cossi (PhD student) Towanou Houêтчégnon (PhD) Bienvenue Sourou (PhD student) Adigla Appolinaire Wédjangnon (MSc) Asaël JJS Dossa (MSc) Benjamin AK Dossa (MSc) Juste-Mesmes Amanoudo (MSc) Anselme Tchétangni (PhD student) Laurent Gnonlonfin (PhD student)
2016	XVII th edition of International Scientific Days of Lomé. Scientific research in front of the challenges of climate changes and the bet of development. University of Lomé, Togo. 2016 Oct 3-8.	Christine Ouinsavi (Professor) Alohou Evarist Cossi (PhD student) Towanou Houêтчégnon (PhD)
2016	10 th edition of International Symposium on preservation and sustainable use of oasis systems: Sharing experiences on these desert sites at very high agro-sylvo-pastoral value. Abdou Moumouni University of Niamey, Niger. 2016 Sept 28-29.	Alohou Evarist Cossi (PhD student)

2016	1 st Science and Enterprise Forum for Innovation and Development. University of Abomey-Calavi, Benin. 2016 Oct 12-14.	Christine Ouinsavi (Professor) Yves Boko-Haya (MSc)
2015	2 nd Symposium on Scientific Research for Local Development. University of Parakou, Benin. 2015 Nov 23-25.	Alohou Evarist Cossi (PhD student) Bienvenue Sourou (PhD student) Gbèdothichthé Gwladys Azongnidé (BSc)
2015	V th Symposium of Sciences, Cultures and Technologies of University of Abomey-Calavi (Republic of Benin). 2015 Sept 28 – Oct 3.	Alohou Evarist Cossi (PhD student) Towanou Houêthchégnon (PhD student)
2014	XVI th edition of International Scientific Days of Lomé. Contribution of scientific and technological research to achievement of the objectives of sustainable human development in Africa. University of Lomé, Togo. 2014 Oct 20-25.	Bienvenue Sourou (PhD student) Towanou Houêthchégnon (PhD student)
2014	First National Conference of the Forests and Forest products Society. Abeokuta, Nigéria. 2014 Avril 23-25.	Nestor Sokpon (Professor)
2014	First Benin national workshop on Neglited or Utilized Species (NUS). University of Abomey-Calavi, Benin. 2014 Feb 27-28.	Bienvenue Sourou (PhD student) Towanou Houêthchégnon (PhD student)

2014	XXVII th Symposium of International Association of Climatology. 2014 july 2-5 – Dijon (France)	Hountondji Yvon Carmen (PhD)
2014	International Symposium in homage for Gérard Moguedet. University of Angers. 2014	Hountondji Yvon Carmen (PhD)

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