

RESEARCH INTERESTS

- Quantitative characterization of wood properties
- Wood Structure- property Relationship .
- Wood Composite
- Wood Fibre and Pulp/Paper Manufacturing.
- Wood/Agricultural waste Utilization
- Recycling of Waste papers
- Natural wood Adhesives Formulation
- Solar Energy for Drying Wood
- Development/Adaptation of Appropriate Technology Machines for processing wood.

(b). RESEARCH IN PROGRESS

1. Quantitative characterization of Nigerian woods using Stereological techniques. This study employs the principles of stereology to quantitatively characterize the properties of some Nigerian hardwoods. The principles center on the application of geometrical-statistical techniques and equations to three dimensional structure quantities. The results will provide numerical assessments of wood structure needed for predicting properties and performance in various applications of processes.

2. Agricultural Residues Utilization Research. Studies are continuing on the utilization potentials of producing composite boards from agricultural residues. Efforts are being made to overlay such composite boards with other material substrates for both quality and performance improvement.

3. Penetrability and permeability studies of selected Nigerian hardwoods treated with wood preservations. The primary objective of the study was to determine the penetrability and treatability of selected plantation grown Nigerian hardwoods. Any of such species, which prove treatable, will no doubt have an increased commercial values leading to a more efficient utilization of the plantation forest resources and providing local treating plants with more species they can confidently treat.

4. Utilization potentials of water hyacinth for particleboard manufacture. Efforts are being made to find use for the problematic weed plant as a raw material for board making. Water hyacinth has been declared a nuisance plant weed because of its interference with the use of water by causing direct obstructions to navigation, by checking water flow, in irrigation channels and by degrading water quality for domestic use as well as being responsible for drastic changes in the plant and animal communities of the fresh water environments.

5. Wood quality studies on caribae provenances growing in Nigeria. Since the establishment of this and other provenances of softwood species in the country no study has been initiated to investigate the wood quality properties of such softwood trees. Information on the wood quality assessments of these provenances are nonexistent. The study was therefore initiated as preliminary work on the wood quality properties of *Pinus caribae* provenance growing in

Nigeria. It is believed such information will assist the foresters when selecting provenances for future tree improvement programmes.

6. Structural flake-board manufactured from Nigerian hardwoods. The study attempts to investigate feasibility of producing structural panels from Nigerian hardwood species. The development of such panels may stimulate another new market share potential in the traditional structural plywood markets. The greatest challenge here is in the modification of wood product technology to permit use of small-sized and low-quality under-utilized hardwoods now left in our forest after the depletion of larger high-quality logs traditionally peeled for plywood manufacture.

7. Solar energy utilization research. Research efforts on solar energy utilization for drying wood and other agricultural crops continue. The present effort is in modifying and improving on previously designed solar dryers. Such modified designs are being tested for performance and efficiency.

8. An additional advanced wood characterization study was initiated on plantation grown Caribbean Pine. The relationship between the growth rate of the species and some wood parameters desirable for pulp and paper making. Specific objectives of the work include: the determination of the optimum rotation age of the species for paper making; the evaluation of the quality of the pulp and paper samples produced from the sampled materials and comparison of the paper quality of the sampled species from different age groups.

9. Evaluation of the properties of plantation grown small diameter logs (SDL) and determination of their suitability for various wood products. The study is an applied research work with the primary aim of obtaining basic information on the properties of the sampled wood species that are desirable for their use potentials. Presently, there is a dire need to explore other Nigerian indigenous lesser-known wood species of small diameter sizes to replace the traditional large size logs that are becoming increasingly difficult to obtain from the forest. Some indigenous hardwood species raised in the plantations belong to the SDL category and hence their use potentials should be evaluated to facilitate ready introduction and acceptability into the timber market. The work commenced in 2002 and is being supported with the University of Ibadan Senate Research Grant.

10. Development and adaptation of technology for primary processing of small diameter logs. The research work is aimed at developing an appropriate technology for processing of small diameter logs currently harvested from the Nigerian forests. It has been observed that the traditional large diameter logs of economic importance are becoming extinct due to the excessive depletion of our natural forest over the years. There is therefore the urgent need for the saw milling industry to modify and adapt their processing machinery to be able to convert the small diameter logs that are currently being obtained from both the natural forests and the man-made plantations. This is another on-going multidisciplinary research work in which I am involved being carried out between the Department of Agricultural Engineering and that of Mechanical Engineering. It is a Senate Research Grant funded project, which was awarded in year 2002.

11. Formulation of natural glue for wood products. This is the second research project initiated on this research theme. The present work is to examine the potentials of fortifying some indigenous starch derivatives as natural glue formulation for the wood products industry. Apart from the exorbitant price of synthetic adhesives currently in use in a backward economy like Nigeria, there is also the attendant problem of pollution/health hazard. The natural glue being researched into would be formulated from the highly abundant renewable resources, which are presently underutilized to bond various wood and wood derived products. This study is in response to the national call by the Raw Material Research and Development Council (RMRDC) for concerted efforts in the search for natural glue for the wood using industry. The research is a multidisciplinary wood involving scientists from the Departments of Agricultural Engineering and that of Chemistry. It commenced in year 2002 and is being supported with funds from the University Senate Research Grants.

12. Design and Fabrication of machines. There are two on-going research projects that have to do with designing and fabrication of equipment and machines for use in the wood industry. These are the wood briquetting manual and motorized machines and waste paper recycling equipment, both of which are funded by the special University Mission Research grants. The manual wood briquetting machine, converts wood wastes into wood briquettes for use as wood fuels. The machine has been successfully developed and patented. The motorized version is presently nearing completion. Similarly, the waste paper recycling machine is also being developed to convert waste papers into recycled stock for use in the paper industry.

Dissertation and Thesis

1. **Onilude, M.A.** (1982) Quantitative anatomical characteristics of loblolly pine (*Pinus taeda*) and cotton wood (*Populus deltoids*) and their relationships to the physical and mechanical properties Ph.D. Thesis, V.P.I and State University, Blacksburg, Va. U.S.A. pp 1-190.
2. **Onilude, M.A.** (1980) The influence of incorporated preservatives on the properties of board manufacture from template hardwoods. M.S. Thesis. University of Maine Orono. Ma. U.S.A.
3. **Onilude, M.A.** Particle manufacturing technology and production systems. Undergraduate Dissertation College of Arts and Technology, High Wycombe, England.

Publications

1. Onilude, M.A. (2011) Pulp and Paper Industry: A neglected Gold Mine in Nigeria. An Inaugural Lecture, University of Ibadan 2010/2011 session. Pp. 78.