

**PRODUCTION AND MICROBIAL CHARACTERISTICS OF PARTICLE
BOARDS PRODUCED FROM SOLID WASTE.**

AWOSOLU, BABAJIDE OLALEYE

B. TECH (HONS) PURE AND APPLIED BIOLOGY (LAUTECH)

**A THESIS SUBMITTED TO THE INSTITUTE OF ECOLOGY AND
ENVIRONMENTAL STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc.) IN
ENVIRONMENTAL CONTROL AND MANAGEMENT OF OBAFEMI AWOLOWO
UNIVERSITY, ILE-IFE, NIGERIA**

2008

ABSTRACT

This study investigated the conversion of two solid wastes, namely sawdust and paper into particle board using low cost organic binders. The study determined the appropriate and optimum concentration of low cost organic binder, and identified the microorganisms present in the raw materials and finished particle board. This was with a view to determining whether the solid wastes will be convertible with a minimum cost and microorganisms load.

Sawdust, waste paper, cassava starch, maize starch and magnesium oxide were used as raw materials for this work. These raw materials were first cultured in the laboratory to identify the bacteria and fungi present in them. Two different concentrations (10 %w/w and 30 %w/w) of cassava and maize starches were prepared and mixed with homogenized paper, saw dust and magnesium oxide. It was then molded into particle board using a press machine at 200 KN. The shear strength of the particle boards produced were determined using an unconfined compression machine. Yaw's algorithm was used in the analysis of the 2^3 factorial experiments. The prominent effect and/or interactions were then optimized to determine the most suitable binder and its appropriate concentration for particle board production. The particle board produced was then soaked in water for one day and for three days to know the effect of water on it when wet and when dry. A sample of the particle board was also subjected to microbiological test to determine the microorganisms that might have grown due to the wetting condition.

The result showed that both sawdust and paper dust were suitable materials for particle board production, and that both maize and cassava starches were good binders though maize starch binds better at an optimum concentration of 20 %w/w. The microorganisms found in the raw materials were species of *Klebsiella*, *Clostridium*, *Pseudomonas*, *Rhizopus*, *Mucor*, *Aspergillus*, *Fusarium* and *Scopulariopsis*

microorganisms found in the raw materials were species of *Klebsiella*, *Clostridium*, *Pseudomonas*, *Rhizopus*, *Mucor*, *Aspergillus*, *Fusarium* and *Scopulariopsis* while in the finished particle board the microorganisms found were *Klebsiella edwardsii*, *Pseudomonas aeruginosa*, *Micrococcus luteus*, *Rhizopus stolonifer* and *Scopulariopsis brevicaulis*. There was a reduction in the number and specie of microorganisms from the raw material to the finished product.

This study concluded that both saw dust and waste papers were suitable materials that can be converted into particle board.