
 RECENT RESEARCH ACTIVITIES

Comparison of mechanical properties of wood-based materials manufactured from plantation and natural woods

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Recently, natural forests have been decreased significantly due to excessive deforestation. To preserve natural forests and to perform sustainable forest management, plantation forests are expanding gradually in Asia region. Broadleaf trees such as *shores spp.* have been afforested in Indonesia. Our laboratory took part in the research project which is Creation of the paradigm of sustainable use of tropical rainforest by the intensive forest management and advanced utilization of forest resources as part of Japan Science and Technology Agency Special Coordination Funds for Promoting Science and Technology (SCF) Program. In this project, we tried to compare the mechanical properties of wood-based materials manufactured from plantation and natural woods. Each *Shorea leprosulla* tree was cut down from natural and plantation forests in Indonesia. The logs were peeled out into veneers (300×300×3mm).

Manufacture and evaluation of particleboard

In case of using polymeric diphenylmethane diisocyanate (PMDI), ten percent acetone was added to the PMDI, and the solution was sprayed on to the particles at 8% solid content based on the oven-dried weight particles. The particles were mat-formed and hot-pressed at 160°C for 10min. The size of the board was 300×300×9mm, and target density was 0.8g/cm³. When citric acid and sucrose were used as an adhesive, both chemicals were dissolved with water at the ratio of 1 to 3. The concentration of the solution was adjusted to 59wt%, and the solution was sprayed on to the particles at 20% solid content based on the oven-dried weight particles. After mat-forming, the mat was hot pressed at 200°C for 10min. The board size and target density were the same as described above. According to JIS A 5908 for particleboard, bending properties, internal bond strength and dimensional stability were evaluated.

Manufacture and evaluation of 3-ply plywood

Commercial PF resin with the solid content of 45.5% including some additives was applied onto both sides of the middle veneer. The spread rate was 233g/m² according to the instructions. The three veneers were assembled together by hand, and hot pressed at 130°C and 1MPa for 6min. The plywood fabricated was cut into standard tensile share test specimens following Japanese Agricultural Standard (JAS). The normal and the repeated boiling tests were performed.

In case of using PMDI as an adhesive, the strength of particleboard made from natural wood was obviously higher than that of particleboard made from plantation wood. The particleboard bonded with citric acid and sucrose indicated also similar trend although whole values were low. Comparing plantation wood and natural wood in plywood, the bond strength of using natural wood was a little superior to that of using plantation wood. Judging from results obtained, it was clarified that natural wood brings rather good wood-based materials as compared with plantation wood. However, further research is necessary to clarify the differences of using plantation and natural trees.

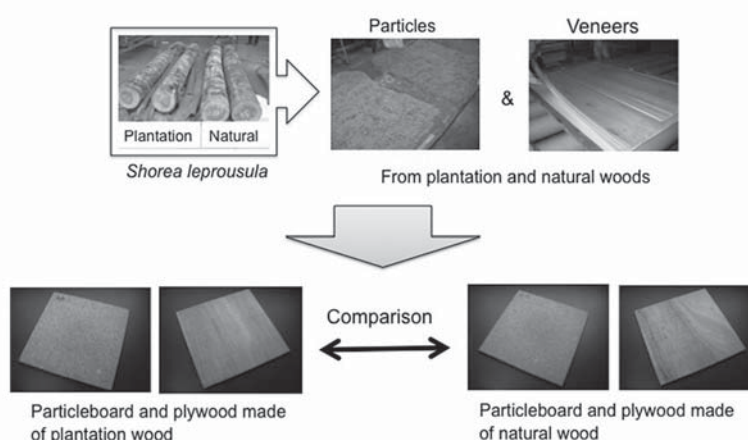


Figure 1. Scheme of experiment.